AMD Phenom II X3 720 Black Edition | Nvidia GeForce 3D Vision | Chieftec HM-03

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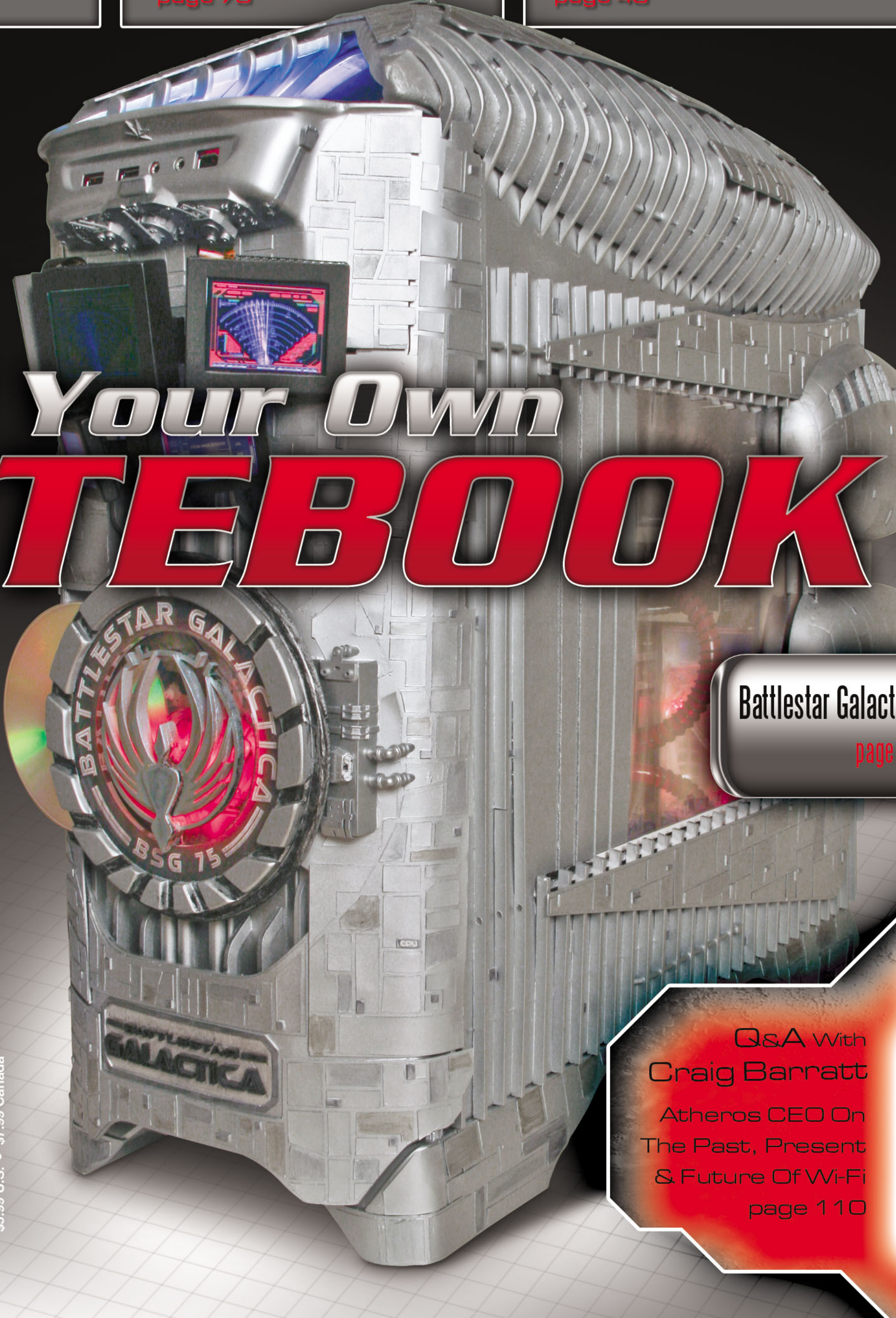

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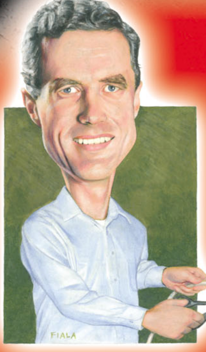

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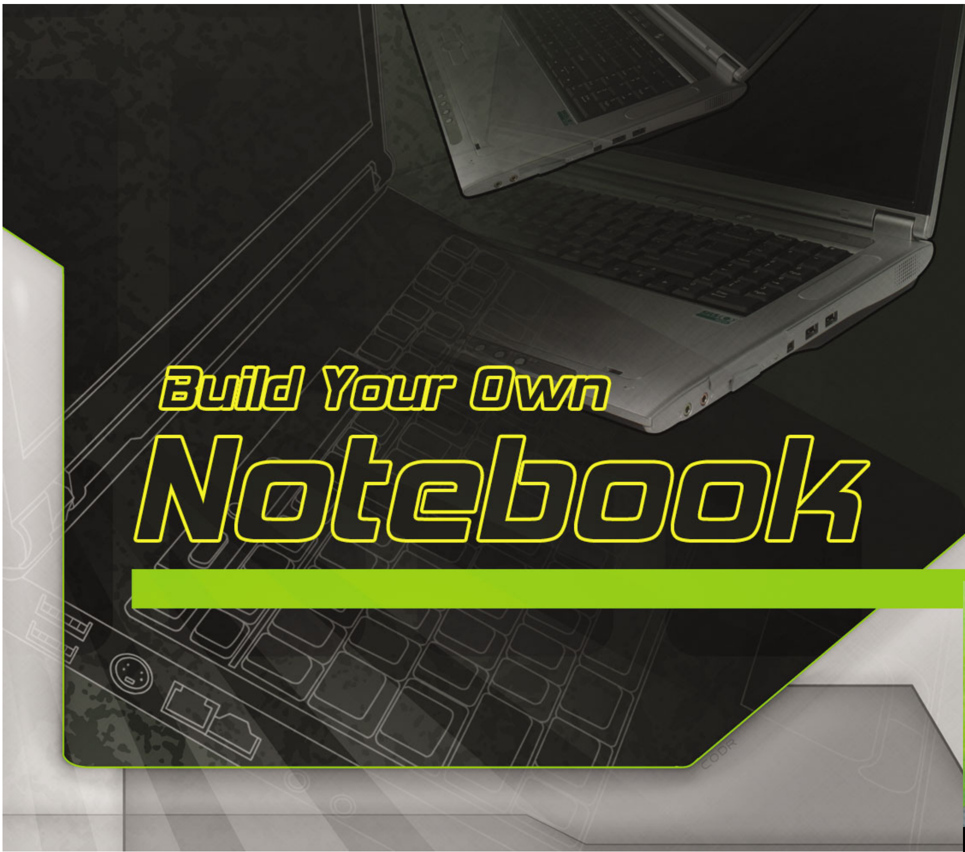

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Did you find the hidden *CPU* logo on our cover? Turn the page for the answer.

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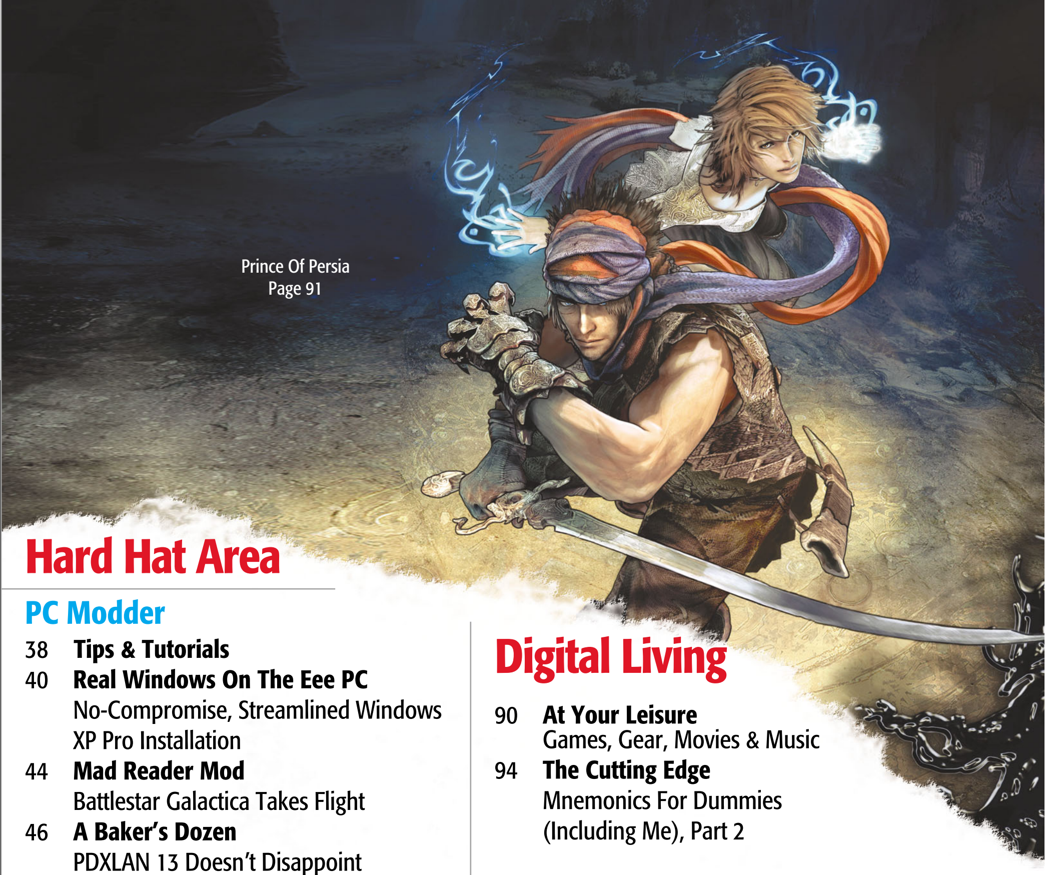

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Strange stats and other oddball items from computing's periphery: 96, 99

EDITOR'S NOTE

Like most segments of society, the modding community includes folks from a broad range of backgrounds, professions, and points of view. Perhaps the most salient philosophical continuum within this group of people, however, is one that has performance concerns on one extreme end and aesthetic concerns on the other.

To some, PC modding is all about the bling; it's a quest to drastically alter the visual qualities of the all-too-often bland modern PC case and, in some cases, the peripherals that accompany that case wherever it goes. These acolytes of beauty trade in acrylic, UV reactive doodads, and automotive-grade paint. They create breathtaking structural edifices from a diverse range of materials, and for them, a PC case is much more than a chassis for holding together a collection of components. It is a blank canvas, a chance to assert their individuality, style, and tastes to the rest of the world. In other words, it is art.

The performance modder, on the other hand, sees modding as a means of squeezing out every available drop of juice his system is capable of producing via tampering with clock speeds, voltage, memory timings, and so forth. These activities are often augmented by introducing custom cooling methods into a system, ranging from monster fan-heatsink combos up to highly exotic (and even dangerous) substances such as liquid nitrogen. High-end performance modding requires a keen grasp of airflow dynamics, component stress and heat tolerances, and electronics engineering theory. In short, this is science.

Artistic and scientific disciplines may be a world apart or they may be tightly interrelated, depending on whom you ask, and at the end of the day there are no right or wrong answers. But I would suggest to you that the best modders, the true craftsmen, are those who bend beauty and performance to their will in equal measures. Those who will settle for nothing less than perfection in every aspect of their work.

Brian "Boddaker" Carter is such a modder, and I hope you enjoy this month's outstanding cover mod, Battlestar Galactica, as much as we enjoyed working with Brian to produce this issue's cover and "Mad Reader Mod" feature.

C. T

Chris Trumble, Publication Editor, *CPU*

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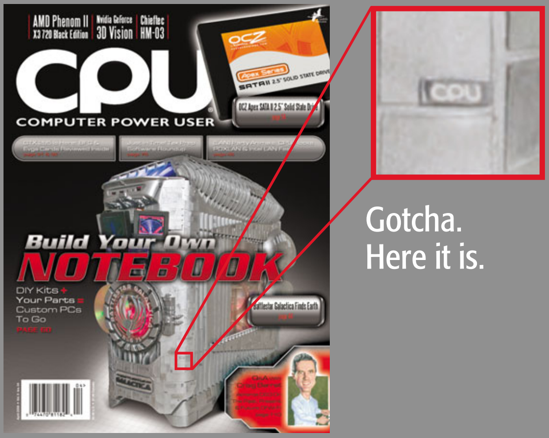
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Gotcha.
Here it is.

Compiled by Blaine Flamig

Digicam Models & Shooting Tips Abound

January traditionally means new digicam announcements. This year, that meant Kodak's 12MP EasyShare Z980 IS ($399.95) with 24X zoom, image stabilization, and 720p HD movie support and nine fresh Olympus models, including the Stylus Tough-8000 ($399.99) and 6000 ($299.99), both "shockproof, waterproof, freezeproof, crushproof, and shakeproof." The Olympus SP-590 Ultra Zoom ($449.99), meanwhile, is a point-and-shoot with 26X wide-angle optical zoom, "the longest, most powerful in the world." Elsewhere, Panasonic's upcoming 10MP Lumix DMC-FS7 ($159), DMC-FS15 ($199), and 8.1MP Lumix DMC-LS85 ($119) include iA mode (auto detection and correction); Mega O.I.S. (blur correction); and ISO, scene selector, and exposure technologies. In related news, the SD Association announced plans for new SDXC (eXtended Capacity) cards in 2009 at up to 64GB and 2TB cards (enough for 100 HD movies) in about five years. ▲

The ABCs Of Typing

Ever try to explain the logic behind QWERTY to someone who can't type? Yeah, a waste of time. Enter the Fast Finger Keyboard ($27.95), a model with alphabetically arranged keys from creators Faith Quintavell and Lynn Grieco. The board toggles ABC/QWERTY layouts and includes quick-access IM abbreviations via the Function keys. SmartFish Technologies' Pro:Motion Keyboard ($130), meanwhile, comes from chiropractor Dr. Jack Atzmon. His design "slowly adapts and adjusts to your typing style" via a proprietary Dynamic Positioning Controller that "studies your usage pattern and makes periodic yet imperceptible adjustments to the height, angle, and radial position of the device." ▲

WD Ups The Storage Ante

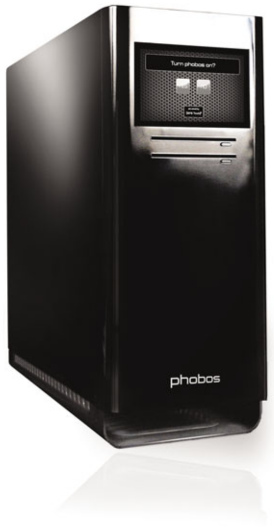
Western Digital is now offering storage to the tune of 2TB via a new Caviar model, billed as "the world's highest capacity drive" and member of WD's environmentally friendly Green family. The 3.5-inch beast ($299) has four 500GB platters (400Gbpsi areal density; 32MB cache) and can hold 240 hours of HD (720p or 1080i) video. The capacity surpasses Seagate's troubled 1.5TB Barracuda 7200.11, a drive which many owners claimed failed unexpectedly, resulting in data loss. After firmware was blamed, Seagate released an update Jan. 16, which reportedly only led to more failures. Seagate has since released a second update to handle all reported flaws. Seagate is also offering free data recovery to those affected. ▲

The Right & Wrong Way To React

When IBM sued 26-year employee Mark Papermaster months ago, citing contract/noncompetition reasons after Papermaster left IBM to lead Apple's iPod/iPhone engineering division, Papermaster countersued, claiming IBM and Apple weren't even competitors. The pair settled in January, leaving Papermaster free to join Apple with the condition that he swears twice during 2009 that he hasn't disclosed IBM details to anyone. Rajendrasinh Makwana, however, bypassed the court system after Fannie Mae fired him in mid-January, allegedly rigging a PC "time bomb" to spread malware that FBI Agent Jessica Nye stated could have "reduced if not shut down operations" at Fannie Mae a week or longer, potentially damaging 4,000 servers. Another Fannie Mae engineer, however, discovered Makwana's script before it exploded. ▲

BFG Presents The Phobos

Meet the Phobos, the first gaming/multimedia PC from video card and PSU maker BFG. BFG says it's keeping "graduated gamers" in mind when building the handmade rigs, which come in Performance ($3,000), Advanced ($5,000), and Elite ($8,000) models. The Elite ships standard with an Intel 3.2GHz Core i7 965 Extreme Edition chip, two quad-SLI BFG GeForce GTX 295 cards, a GeForce GTX 285 dedicated to PhysX duties, 6GB of DDR3 RAM, CoolIt liquid cooling, Windows Vista Ultimate (Media Center included), and Blu-ray Disc drive all built on a BFG-approved Intel X58-centric board. Arguably, Phobos' most alluring doodad is a slick front touch panel that can cycle through various system views. Available Concierge Service that includes in-home installation and six months of follow-up visits isn't bad, either. ▲



HARDWARE MOLE

EU Turns Cold Shoulder To Intel

As with many tech companies these days, things could be better at Intel. The economy forced the CPU giant to announce 5,000 to 6,000 job cuts in 2009, and it plans to shut down production at four plants, including in Hillsboro, Ore., and Santa Clara, Calif. More recently, a European Union court denied Intel's request to delay an investigation into antitrust practices overseas that allege Intel offered rebates to computer makers in an effort to discourage use of AMD-made chips. In good news for builders, Intel slashed pricing on dual-core and quad-core CPUs in late January, including taking about 40% off the Core 2 Quad Q9650. AMD, meanwhile, announced 1,100 job (about 9% of its workforce) and salary cuts in late January after previously announcing about 2,100 layoffs in 2008. ▲

The Ups & Downs Of The Tech Sector

So, just how bad is the economy hitting the tech sector? Data from Challenger, Gray & Christmas indicates roughly 187,000 tech jobs were eliminated last year, up 74.2% from 2007. In 2008's second half, cuts skyrocketed 167%. National Venture Capital Association and Thomson Reuters, meanwhile, report venture capitalists gave startups just $3.4 billion in Q4 2008, down 71% from the $11.7 billion gifted in Q4 2007. For 2008, 211 venture capitalists doled out $28 billion in funds, a 21.4% decrease from 2007. Still, a survey of 19,400-plus respondents from Dice.com shows the average tech worker's salary rose 4.6% from 2007 to $78,035 in 2008, with the computer hardware category climbing 9.4% ($77,387). ▲

Compiled by Blaine Flamig

One Billion & Counting

The "total global Internet audience" topped one billion visitors for the first time ever in December 2008, claims data from comScore's World Metrix audience-measurement service. China led all countries with 179.7 million audience members (17.8%), while the United States totaled 163.3 million (16.2%), Japan 59.9 million (6%), Germany 36.9 million (3.7%), and the UK 36.7 million (3.6%). comScore counted visitors as those 15 years or older using home and work computers. "The second billion will be online before we know it, and the third billion will arrive even faster than that, until we have a truly global network of interconnected people and ideas that transcend borders and cultural boundaries," stated comScore CEO Magid Abraham. comScore data also shows Facebook grew a whopping 127% through 2008, amassing 222 million visitors. ▲

U.S. Newspapers Thrive Online

U.S. citizens might be ditching doorstep-delivered newspaper subscriptions, but they're sure turning their attention online. Recent Nielsen Online data shows that unique visitors to the U.S.'s top 10 newspapers' online versions climbed 16% in December 2008 (40.1 million) from December 2007 (34.6 million). *The New York Times* netted 18.2 million visitors, *USA Today* 11.4 million, *The Washington Post* 9.5 million, *Los Angeles Times* 8 million, and *The Wall Street Journal* 7.2 million. The *New York Daily News'* online edition, meanwhile, racked up 5.9 million visitors in December 2008, up an astronomical 99% from December 2007. *The Boston Globe*, however, fell to 4.1 million from 4.7 million. ▲

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It's ONLY the economy, stupid
The president said he was taking full responsibility for rescuing the U.S. economy, in its worst downturn in 80 years.

Steelers Ben, Santonio real giants
Lupica: One year later, it wasn't Eli Manning to Plaxico Burress with 35 seconds left. It was Roethlisberger to Holmes.

Where is 'Groundhog' cast now?
Groundhog Day comes once a year -- unless you're weatherman Phil Connors. Check out where the cast is now.

Can't Miss Photos

The First Lady like you've never seen
Take a look at a rare closeup view of Michelle Obama.

Super Bowl of parties
A who's who of celebs huddle together during the week leading up to the Super Bowl.

Still angry over lost White House? Mac won't vote for Bam's stimulus
Sen. John McCain said Monday he'd vote against the current, house-passed stimulus bill backed by President Obama to pump up the economy.

Latest News
- Queens family recalls fire horror: It's a 'miracle we're alive'
- Pot charges dropped against Obama's half-brother
- 'Adopted' kids turn on mob bosses
- Brilliant student, pal cut down in stolen car crash
- Lupica: Super Bowl no quick fix for economy
- Gillibrand's vacated seat a mess for Dems

Phil sees more winter
The economic forecast is not the only thing that's bleak, predicted Punxsutawney's beloved groundhog. Read more

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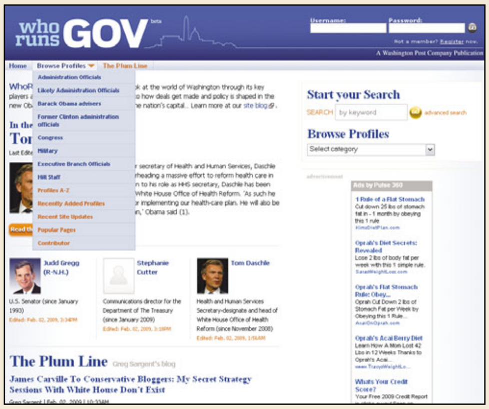
Maybe The Irish Aren't So Lucky

In what's believed to be a world first, Irish ISP Eircom reached a court agreement in late January with the four major music labels that could see Eircom discontinuing Internet service to illegal music traders. *The Irish Times* reported that the labels will give Eircom the IP addresses of those detected of illegally uploading/downloading protected works. Ultimately, Eircom will warn those suspected of piracy twice before finally denying access. Reportedly, the music labels' lawsuit stemmed partially from Eircom advertising its service on The Pirate Bay. ▲

SIGHT SEEING

WhoRunsGov.com Dishes On Washington Insiders

President Barack Obama isn't the only one working to make a change in Washington. WhoRunsGov.com wants to transform how you learn about D.C.'s movers and shakers. Launched in January, the site hopes to create an "ever-growing database of government power-brokers," thus providing key info on "new administration officials, lawmakers, senior Hill aides, and ultimately interest group and think tank experts." Owned by The Washington Post Company, the site's content will come initially from in-house staffers and include the daily Plum Line blog from Greg Sargent. A "moderated wiki" is planned for later this year that will let registered users revise and create profiles. ▲



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r secretary of Health and Human Services, Daschle
rheading a massive effort to reform health care in
n to his role as HHS secretary, Daschle has been
White House Office of Health Reform. "As such he
r implementing our health-care plan. He will also be
n," Obama said (1).

Judd Gregg (R-N.H.)
U.S. Senator (since January 1993)
Edited: Feb. 02, 2009, 3:14PM

Stephanie Cutter
Communications director for the Department of The Treasury (since January 2009)
Edited: Feb. 02, 2009, 3:18PM

Tom Daschle
Health and Human Services Secretary-designate and head of White House Office of Health Reform (since November 2008)
Edited: Feb. 02, 2009, 1:56AM

The Plum Line Greg Sargent's blog

James Carville To Conservative Bloggers: My Secret Strategy Sessions With White House Don't Exist

1 Rule of a Flat Stomach
Cut down 25 lbs of stomach fat in - 1 month by obeying this 1 rule

Oprah's Diet Secrets: Revealed
Lose 2 lbs of body fat per week with this 1 simple rule.

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Learn How A Mom Lost 42 Lbs in 12 Weeks Thanks to Oprah's Acai...

Whats Your Credit Score?
Your Free 2009 Credit Report

Plinky Wants To Inspire You

Need inspiration for creating Web content? Try Plinky.com, "your Web enabler since 2009." Plinky is an effort from former Google guy Jason Shellen and friends that poses members questions, challenges, requests, and other prompts to share creatively via blogs, Twitter, Facebook, etc., using maps, links, photos, playlists, videos, or whatever else you desire to make your point. Recently, Plinky asked members to "Defend your vice." Our favorite reply: "The Internets, how I love and loathe you." Expectedly, Plinky has several social networking features available, including tracking "Your Followers" and "People who follow you." Blogger, LiveJournal, Xanga, and other support also await. ▲

UNRESTRAINED POWER

Are you ready for Alienware's most powerful Area-51® yet? With the unmatched speed of the Intel® Core™ i7 Extreme Edition processor as well as the intense graphics capabilities of the NVIDIA® GeForce® GTX 295 GPU, the Area-51® X58 cranks out the highest benchmarks for the ultimate gaming experience.

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Compiled by Blaine Flamig

Mozilla Puts Its Money Behind Ogg Theora

Mozilla's Christopher Blizzard recently blogged that "because anyone can build tools without permission that speak the lingua franca of the Web," users can find pretty much anything they need. That, he says, makes the Web "a truly vibrant marketplace"—unless business relates to online video. Though there's plenty to watch at YouTube, such sites "don't share the same democratized characteristics that have made the Web vibrant and distributed. And it shows," Blizzard writes. As an alternative, Mozilla recently awarded the Wikimedia Foundation a $100,000 grant to enhance and improve the Ogg Theora video and Vorbis audio codecs. Mozilla is adding support for Xiph.org's Theora into Firefox 3.1, as well as Vorbis. "We hope that by releasing video from the plug-in prison and letting it play nice with others we'll be able to open up a new wave of creativity around video," Blizzard wrote. ▲

BEWARE: Zombies Traverse These Roads

We're not sure what's better, the warnings that still-unidentified hackers configured to flash on portable digital road signs near Austin, Texas, in late January or the reactions the stunt got. Our favorite response to the hackers' pleas of "Caution! Zombies Ahead!" and "Run for cold climates, the end is near!" came from "Zombicidal Maniac," who sarcastically took the *Austin American-Statesman* to task on its Web site for reporting that "cold weather would kill off the undead horde." As Zombicidal reasons, "If only avoiding the zombie apocalypse were so simple!" "Now," he wrote, "when the day of judgment arrives, my neighbors will be ignorantly chucking ice cubes while their family perishes to the onslaught." Nice. ▲

The 25 Most Dangerous Coding Errors

Security vets from 30 U.S. and global organizations, including universities, Symantec, Microsoft, Oracle, Secunia, Red Hat, CERT, RSA, Apple, the National Cyber Security Division, and NSA's Information Assurance Division recently compiled a list of the 25 most dangerous coding errors (www.sans.org/top25errors//?cat=top25). According to MITRE's Bob Martin, project manager, "Shockingly, most of these errors are not well understood by programmers; their avoidance is not widely taught by computer science programs; and their presence is frequently not tested by organizations developing software for sale." Merely two coding errors resulted in 1.5 million-plus online breaches last year, the project claims. SANS Director Mason Brown stated, "Now it is time to fix them." ▲

SOFTWARE SHORTS

Wait for Windows or be instant-on with HyperSpace alongside Windows!
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HyperSpace
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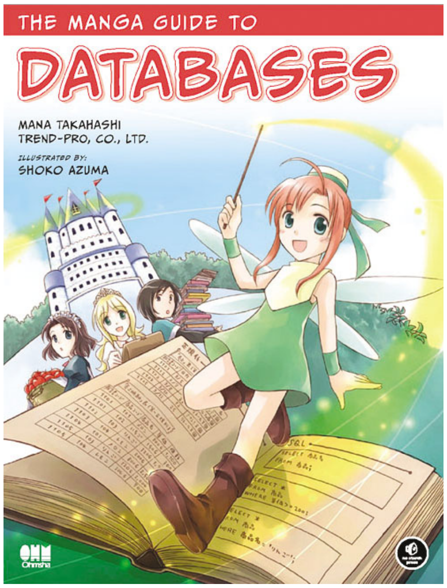
Life moves fast. So should you. Explore HyperSpace.

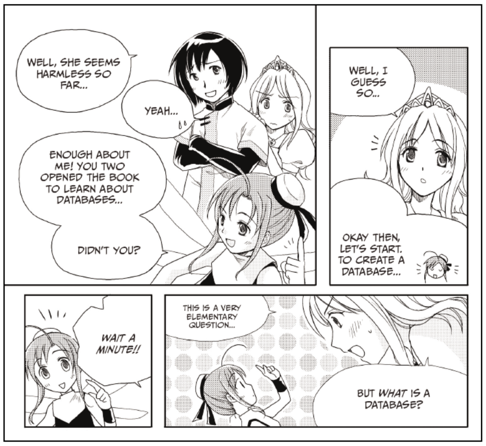
HyperSpace To Give Asus Notebooks Some Pep

Phoenix Technologies inked a deal with Asus in mid-January to preinstall HyperSpace, its Linux-based quick-booting tool, on Asus' future notebooks and netbooks. Billed as being "as easy and efficient to use as a cell phone," HyperSpace gets right to loading Web apps while Windows takes its time loading. HyperSpace also picks the best available network and has integrated battery-extending features. The Dual version essentially creates a dual OS-like landscape for Atom or Celeron notebooks, while Hybrid can switch between Windows and HyperSpace—if you're running Intel Virtual Technology on a Core Duo or higher chip. Unfortunately, consumers reportedly will have to eat the cost of an annual Dual ($39.95) or Hybrid ($59.95) HyperSpace subscription. ▲

Guide To Databases, Manga Style



Poor Princess Ruruna. Seems her "fruit-selling kingdom is a tangle of conflicting and duplicated data, and it has become really hard to sort the melons from the apples and strawberries." Fear not, for the princess needs only to build a relational database—with the aid of Tico, a magical database fairy, of course. Want to know how things turn out for Princess Ruruna and Tico? Get a copy of "The Manga Guide to Databases" ($19.95) from Japanese tech writer Mana Takahashi. Available from "geek entertainment publisher" No Starch Press, The Manga Guide is wonderful, says William Pollock, No Starch Press founder, because "the manga story carries the reader through the book, and the learning happens almost effortlessly." Anyone who can make databases "something fun, not something dreadful," is OK with us. ▲


WELL, SHE SEEMS HARMLESS SO FAR...
YEAH...
ENOUGH ABOUT ME! YOU TWO OPENED THE BOOK TO LEARN ABOUT DATABASES...
DIDN'T YOU?
WELL, I GUESS SO...
OKAY THEN, LET'S START. TO CREATE A DATABASE...
WAIT A MINUTE!!
THIS IS A VERY ELEMENTARY QUESTION...
BUT WHAT IS A DATABASE?

Linus Torvalds Speaks

Linux founder Linus Torvalds isn't prepared to say 2009 is "the year of the Linux desktop," but he did say "in a fair market, Linux will have a much easier time competing." Among other tidbits Torvalds shared in a recent ComputerWorld interview while attending Australia's Linux.conf.au conference were "for historical reasons," he's a Fedora user; he owns an Eee PC, on which he reinstalled his own distro; and he "used to be a KDE user" but thought "KDE 4.0 was such a disaster" he switched to GNOME—though "the GNOME people are talking about doing major surgery, so it could also go the other way." Windows-wise, Torvalds says "Windows 7 being better than Vista is saying a lot. Microsoft may have a huge PR advantage, as people will compare it to Vista and think it is good so 'angels will sing again' like they did with Windows 95 compared to Windows 3.1. So maybe Microsoft did this on purpose." Ouch. ▲

Job Of The Month

Can't get enough of those wicked in-game explosions, cool laser trails, and electrified objects? Then you can be the next master of mayhem for BioWare, the maker of Mass Effect, Neverwinter Nights, and the upcoming Dragon Age role-playing game. The company needs a specialist in virtual ballistics—a Senior Special Effects Artist. Sharpen up your 3D Studio Max and Photoshop skills because you will be called upon to devise new ways of animating spell casting, explosions, gunfire, and just plain blowing things up. You will want a firm understanding of physics, naturally, but also must "have an interest in fantasy and be driven to create effects never before seen in video games," the company says. You will be working with the art team and leveraging the powerful Unreal Editor 3. Experience with texture and shader creation, fine-tuning at the pixel level, and character skinning are expected, but so is a "flair for what looks sensational and fantastical." This is one way to be a mad bomber for a good cause—better gameplay.

tinyurl.com/cmh9gc

By The Numbers

13% Percent of Americans citing the Internet as one of their leading news sources in early September 2001 (Pew)

40% Percent of Americans citing the Internet as one of their leading news sources in December 2008 (Pew)

www.emarketer.com/Article.aspx?id=1006861

HDTV The Digital Revolution Hits The Pause Button

Economic fears finally dialed down Americans' taste for their beloved gadgets. In a recent Forrester survey of 5,000 consumers, 51% said they would be spending less on technology this year than last, with only 44% saying their buying plans had not changed. A mere 5% planned to spend more on gadgetry this year. People are delaying the newest shiny thing, especially GPS devices, satellite radio, and even smartphones, categories where more than 60% of consumers said they were now less likely to buy.

online.wsj.com/article/SB123111189419652363.html?

Holiday E-tailer Traffic Stalls

The 3% drop in 2008's online holiday sales was reflected in the stagnation of traffic to many major e-tailers from Dec. 1 through Dec. 24, 2008, compared to the same period in 2007.

Retailer	2007 Unique Visitors	2008 Unique Visitors	Percent Change
eBay	88,894	85,442	-4%
Amazon sites	70,975	76,240	7%
Wal-Mart	49,632	51,546	4%
Target	47,338	46,837	-1%
Apple	29,450	35,017	19%
Best Buy	28,602	28,555	0%
JCPenney	21,329	18,918	-11%
Toys "R" Us	19,817	18,075	-9%
Sears	18,010	18,413	2%
Circuit City	19,466	15,456	-21%
Overstock.com	18,911	15,951	-16%
American Greetings	17,273	14,666	-15%
Hewlett Packard	15,217	19,425	28%
Dell	17,279	14,305	-17%
Macy's	15,715	15,868	1%

Source: comScore Media Metrix

blog.searchenginewatch.com/blog/081231-081934

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Gaming***:	73 Watts	EUR 24.00
Total saving:		**EUR 81.40**
		(~US$106.1)

*2.5W Standby Last, 20h/d, 365d, 5a
**110W Last, 3h/d, 365d, 5a
***275W Last, 1h/d, 365d, 5a

Fusion 550RF

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www.arctic-cooling.com

The Saint

by Alex St. John

The Inside Dirt

You've probably heard about the class-action lawsuit filed against Microsoft in 2007 over its "Windows Vista Capable" badge program. The suit alleged that Microsoft used deceptive practices to avoid a lull in computer sales after delaying the release of its operating system by indicating that PCs incapable of supporting core Vista features would be capable of running the OS when it shipped.

This story illustrates Microsoft's arrogance by demonstrating the company's contempt for its customers and its willingness to abuse its distribution power to foist a bad product on consumers. There's even a little Intel dirt mixed in here. The funny thing is that I haven't worked at Microsoft in over a decade and yet I can guess exactly how this situation came about. Back in 1994, I was asked by my management to become the first Microsoft "game evangelist;" part of my job would be responding to an Intel initiative to create a platform for gaming that included sound, video, 3D, and multiplayer features, all running in software emulation on Windows. Intel had "invited" Microsoft to participate, and Paul Maritz, who at the time was responsible for Microsoft's OS platform, wanted somebody from the strategy group to assess what Intel was up to and whether it constituted a platform threat to Windows. I was chosen for the job, in part because of my extensive graphics background.

What I found was a major effort on Intel's part to define its own hardware driver architecture that would severely constrain what media features could actually be hardware accelerated and place the burden of media-intensive processing on Intel CPUs. I reported my findings to my employer, suggesting that Microsoft needed to aggressively define its own driver architectures for media acceleration that enabled heavy offloading of media processing from the CPU. If not, the company would find itself at a severe competitive disadvantage to Apple's then-superior media capabilities, with little hope of escaping Intel's control of the Windows media platform. Thus DirectX 1.0 was born.

The result, of course, was a thriving industry for competing 3D hardware accelerators, and ultimately Intel's worst nightmare: the phenomenal success of Nvidia and a wholesale migration of consumer processing demand away from Intel CPUs in favor of powerful 3D GPUs. Intel made a second attempt to dominate Web 3D with CPU-based graphics by licensing 3DR (bribing Macromedia) to include it in Shockwave 3D. Failing this, Intel's final and most devastating strategy to the PC industry was to enter the 3D hardware market itself with cheap, underpowered graphics chips and "incentivize" PC OEMs to ship them in favor of superior ATI and Nvidia chips with "co-marketing funds" (bribes). (Microsoft uses co-marketing funds, too, as a means to discount Windows to big OEM partners without calling it a discount, thus securing preferential promotion of their other software products on new PCs.)

In doing this, Intel severely limited the growth of these competing next-generation chip vendors but also performed a tremendous disservice for itself and consumers by artificially creating an enormous performance gap for gaming between low-end consumer PCs and high-end gaming PCs. The result was enormous damage to the PC game industry that drove much of the growth in high-performance gaming toward consoles, leaving the PC with a dwindling population of the high production value games that people actually buy new PCs to play.

What's this all have to do with Microsoft's ongoing Aero predicament? Microsoft understood that Intel's efforts to undermine demand for powerful non-Intel GPUs was damaging to the overall consumer demand for Windows PCs. With the success of DirectX, we recognized that ultimately it would make sense for all Windows graphics including GDI (the Graphics Device Interface API) itself to migrate to DirectX, thereby raising the bar for superior graphics

> "…Word from the WildTangent QA lab is that the Windows 7 beta is very good and actually faster and more reliable to use than Vista SP2."

hardware acceleration on all PCs. Microsoft's purpose for creating Aero was not to create a compelling new advance in user experience for consumers so much as it was to migrate the entire Windows graphics architecture to DirectX, thereby forcing Intel and PC OEMs to ship better default graphics processors across all PCs. The Windows logo program, which was designed by the group I worked for back in 1992, was the marketing lever to compel partners to comply. Of course, Intel recognized this and squealed, just as they used to do with Paul Maritz back when Microsoft announced DirectX.

All brilliant, diabolical strategies have their flaws, and this one ran afoul of the Vista train wreck. First, Vista was very late and kept slipping, so how could PC OEMs and Intel support Microsoft's aggressive new Vista logo program with billions of dollars invested in PC hardware inventory if nobody knew when the OS was going to ship? Second, Microsoft's reach exceeded its grasp as usual, and instead of letting OEMs and consumers "migrate" voluntarily from XP to the allegedly superior Vista OS product, Microsoft mandated that all its OEM partners would have to ship with Vista and made XP unavailable to them as of the day Vista launched—just in case you consumers were too stupid to appreciate the superiority of Vista and irrationally clung to XP.

This meant that OEMs couldn't make the reasonable business decision to keep offering great XP-based PCs until such a time as Microsoft got around to shipping Vista and worked all the bugs out of it. Given Vista's constant slipping and the rock-and-hard-place Microsoft had placed its partners in, Microsoft naturally received enormous pressure to relent on their minimum system requirements for Vista Capable machines so that OEMs could switch their XP-optimized PC inventory over to Vista at such a time as Microsoft actually got around to releasing the OS. Hence the contorted story we see in the media, justifying the capricious distinction between "Windows Vista Capable," which is code for "repurposed XP-based PC inventory based on crappy Intel GPUs," and "Windows Vista Premium Ready," which is code for "PCs actually built to run Vista based on ATI or Nvidia GPUs."

What's most striking to me about this story from 10,000 feet is the billions of dollars and thousands of employees both Intel and Microsoft have effectively devoted to sabotaging their own success. It's amazing to watch an industry investing so heavily in its own failure. I read somewhere that 65% of all new PCs sold for more than $2,000 are now Macs! The question at this point is whether these folks are institutionally incapable of learning from their costly mistakes or able to take a hard look at themselves and do the right thing for themselves and consumers going forward.

Although I'm extremely cautious about jumping to conclusions, word from the WildTangent QA lab is that the Windows 7 beta is very good and actually faster and more reliable to use than Vista SP2. Apparently they've even relegated the formerly intrusive pop-up dialogs to a special Taskbar item that the user can disable. (Yeah, I don't believe I wrote that either, but I'm sure they'll find something to screw up for me to write about in future columns.)

What I'll really be impressed to hear, however, is that Microsoft intends to make such a fantastic, high-quality OS that consumers will voluntarily migrate to it in a landslide without Microsoft forcing the OEMs to ship it. Will Microsoft announce that it's dispensing with its confusing Windows logo program because OEMs are voluntarily ensuring that all PCs that ship with Windows 7 will by default be "Premium Ready"? Will Intel announce that it's making such a superior and inexpensive graphics part for running Windows 7 and playing games that nobody will need to upgrade to an ATI or Nvidia GPU to play popular games or run the new OS?

That's the press I would expect to hear from companies that have learned anything from their costly mistakes. ▲

Send your feedback to thesaint@cpumag.com

Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent, a technology company devoted to delivering CD-ROM-quality entertainment content over the Web.

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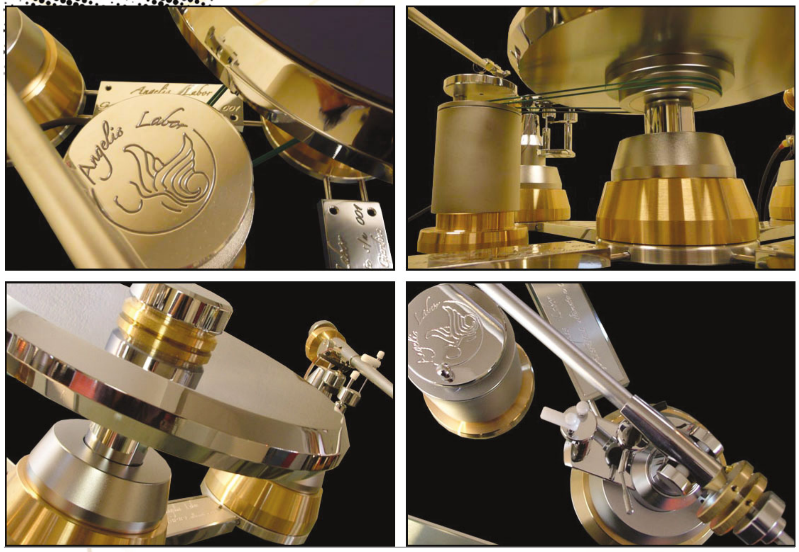
DREAM HARDWARE

These Gizmos Don't Sing It, They Bring It

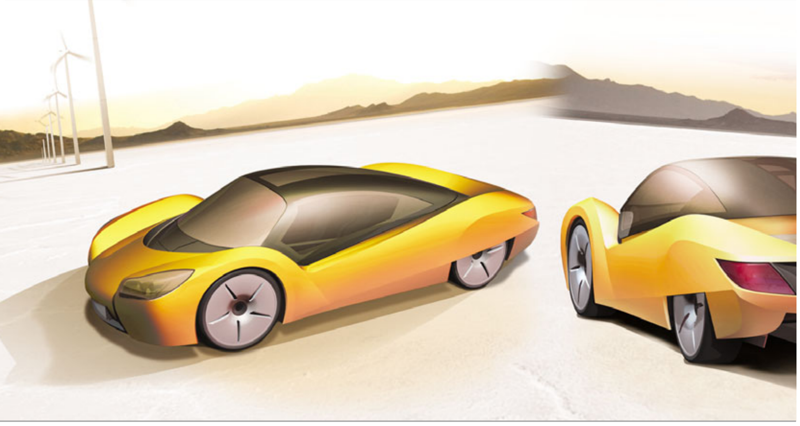
With the sights you're seeing and the sounds you're hearing, you could be forgiven for wanting to stay indoors. But should you venture out to enjoy a spring drive, at least you'll be doing it in a green way.

by Marty Sems



Angelis Labor Gabriel Turntable

Talk about a value-add. Picture a smoking hot model of your choice, and then imagine that she or he also makes a mean black bean salsa. The Gabriel (www.angelislabor.com) is something along those lines. It's a gorgeous, precision sculpture, a masterpiece of engineering. Oh, and it plays your old "Free To Be You And Me" LP, too. Part of Angelis Labor's Spiritual Series, the Gabriel's platter floats like an angel on a cushy, magnetic cloud. Fully arrayed with four arms, the better to bring you tidings of great joy with just the right needle for the record, this horn-blowing herald will sell for about $64,000. The Italian manufacturer is reportedly looking for distributors down here on earth.



Rinspeed iChange

Advancements in zero-emission vehicles benefit us all. Here's one that adapts its shape, and thus its mileage per energy unit, to the number of its passengers. The iChange electric concept car (www.rinspeed.com) takes the form of a teardrop when it's a single-seater. Pick up a couple of friends, however, and the "electronic trick-tail" raises and reshapes the hind end, making two rear seats available. In Rinspeed's words, "the full-blooded sports car turns into a compact sportsvan." Gearheads attending the International Motor Show in Geneva this March can get acquainted with all of the iChange's personalities.

Philips Cinema 21:9

It was easy to convince your dad to buy a widescreen HDTV. "It gets rid of those black bars when you watch a movie," you told him. "About time! I hate those damned bars," he roared, and bought the TV. Now, you reasoned, he could stop single-handedly propping up the accursed fullscreen DVD market. Unfortunately, the first time he fired up "Ben-Hur". . . black bars. Thinner ones, perhaps, but still there. Philips is doing something about it, at least in a handful of European countries. Its new Cinema 21:9 is a 56-inch LCD ultra-widescreen with a 2.37:1 aspect ratio and 2,560 x 1,080p resolution (www.cinematicviewingexperience.com). Mind you, your dad's black bars will now be on the left and right sides for 1.85:1 DVDs and 4:3 TVs, but then he's probably a Stretch-O-Vision man, anyway. Pricing hasn't been set at press time. Philips has no plans to market this in the U.S., which really burns your old man, he will have you know. ▲

Power For The People

High-End PSUs Do Battle

For the past couple of years, virtually all of the power supply manufacturers that cater to PC enthusiasts and power users have released PSUs in the 1 kilowatt range. Although the influx of increasingly more powerful units has slowed somewhat recently, the introduction of new power supplies has not. Instead of focusing solely on higher output, however, many manufacturers have placed a greater emphasis on efficiency and value. What's available today is more efficient and more affordable than ever.

To aid you in your quest for solid, high-quality power supplies, we've rounded up a dozen units from a number of respected manufacturers with output capacities ranging from 600 to 1,200 watts, with advertised efficiency ratings of up to 88%. The prices for the units we've tested here are as varied as their capacities.

How We Tested

Although our test beds reside in a climate-controlled office environment with a relatively stable ambient temperature, we don't have access to the thermally controlled, specialized test equipment many manufacturers use for QC testing their power supplies. Without access to such equipment, we decided to test the power supplies represented in this roundup in a real-world scenario using an extremely powerful system built from off-the-shelf components. To tax the power supplies, we built a system around Intel's ultra-high-end Skulltrail platform, consisting of a pair of 3.2GHz Core 2 Extreme QX9775 quad-core processors, a D5400XS motherboard, 8GB of 800MHz FB-DIMM memory (4x 2GB), a Radeon HD 4870 X2 video card, an X-Fi Fatal1ty sound card, a Killer NIC, two optical drives, and three hard drives, all crammed into a Cooler Master ATCS 840 full-tower case. Although this isn't exactly a worst-case scenario, if a power supply can handle a system of this caliber, it would likely be sufficient for even the most powerful single-CPU rigs.

To place a heavy load on the power supplies while they were installed in the test system, we looped SiSoft Sandra's multithreaded Processor Arithmetic benchmark while also playing a DVD, watching TV in a window, running the RTHDRIBL (Real-Time High Dynamic Range Image-Based Lighting) graphics demo, transferring a file from a NAS device to the system, and defragging one of the hard drives. With all of this going on, our monster of a test machine consistently and constantly consumed almost 600 watts of power. We should also note that we left the system running under load for a minimum of one to two hours with each PSU to see if they would fail while being strained for an extended period.

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www.coolermaster-usa.com
●●●◖

Cooler Master UCP 900

As its name suggests, the Cooler Master UCP (Ultimate Circuit Protection) 900 is a 900-watt PSU targeted squarely at enthusiasts. The unit is not very flashy with its textured, matte black finish, and it doesn't sport modular cabling. Still, the UCP 900 is nevertheless a very good PSU. Cooler Master advertises an efficiency rating of up to 88%, and the UCP 900 has earned an 80 Plus Silver certification. The unit is also SLI-certified and CrossFire-ready. It sports a quad-12V rail design (with varying ratings on each of the outputs), Japanese capacitors, and a variable speed 120mm cooling fan that remains relatively quiet at all but the most demanding loads.

Throughout testing, the Cooler Master UCP 900 never faltered. Under load, our ultra-powerful test bed remained perfectly stable, as did the voltage output on the PSU, according to our trusty multimeter. The Cooler Master UCP 900 was the longest of the power supplies tested here, at about 10 inches. And all of its cabling is hard-wired, which means it's not a great candidate for those of you who are fanatical about neat internal system wiring and cable management. But with solid performance, a relatively high output rating, and a sub-$200 price tag, the Cooler Master UCP 900 is a good buy.

TX 850
$159
Corsair
www.corsairmicro.com
●●●●

Corsair TX 850

Compared to the majority of other companies whose products are represented in this article, Corsair has been in the power supply market for a very short time. In fact, Corsair introduced its first power supply only about two and a half years ago. But in that short time, the company has earned a well-deserved reputation for offering high-quality, well-rounded power supplies, which also happen to be excellent values.

The TX 850 is the highest output unit in Corsair's TX series of power supplies. It is SLI- and 80 Plus-certified, and the TX 850 is also one of only three units in this round-up configured with a single high-output 12V rail design, which aids in compatibility with a broad range of components. We found the TX 850's large 140mm cooling fans to be one of the quietest of the bunch, regardless of load; our performance data suggests that the TX 850 offers above-average efficiency. The output on its 3.3V, 5V, and 12V rails remained stable throughout testing. It's not modular, so cable management gurus should take

The Lowdown On Our Dirty Dozen

To make it easier to assimilate all of the different specifications and capabilities of the power suppliers we tested, we put together a chart listing the features and performance of each PSU. While most of the information in the chart is fairly straightforward, we need to explain some of the data. For example, if peak power data wasn't available for a particular unit, then we listed its continuous output. We should also point out that while some power supplies are listed here as being SLI- or CrossFire-certified, a different version of the same PSU is available with the opposite certification in most cases.

Testing of these power supplies revealed some interesting data. Despite using the same hardware and software to test them all, they all consumed different amounts of power according to a digital power consumption meter. According to our data, the OCZ ModXStream Pro 700W unit pulled the most power from the outlet, which alludes to the possibility that it is the least efficient of the bunch in our workload scenario. Conversely, the Enermax Revolution 85+ 850W unit consumed the least amount of power, which hints to its high efficiency.

	Cooler Master UCP 900	**Corsair TX 850**	**Enermax MODU82+ 625W**	**Enermax Revolution 85+ 850W**	**Enermax Revolution 85+ 1050W**
Rated Continuous (W)	900	850	625	850	1,050
Rated Peak (W)	1,080	1,044	690	1,020	1,260
12V rails	4	1	3	6	6
+12V continuous (A)	25, 20, 22 (x2)	70	75 (3x 25)	180 (6x 30)	180 (6x 30)
+5V continuous (A)	25	30	24	25	25
+3.3V continuous (A)	25	30	24	25	25
SLI-certified	Yes	Yes	Yes	No	No
CrossFire-certified	No	No	No	Yes	Yes
Max wattage tested	588	586	585	582	584
Case Temp as tested (degrees Celsius)	59	59	60	61	61
Power Factor as tested	0.99	0.99	0.99	0.99	0.99
Efficiency rating (as advertised)	Up to 88%	80%+	82 to 88%	85 to 88%	85 to 88%
80 Plus-certified	Yes (Silver)	Yes	Yes (Bronze)	Yes (Silver)	Yes (Silver)
Modular cables	No	No	Yes	Yes	Yes
Cable side	Motherboard	Motherboard	Motherboard	Motherboard	Motherboard
Fan(s) size	120mm	140mm	120mm	135mm	135mm
PCI-E 8-Pin	2	4 (6+2)	4	6 (6+2)	8 (6+2)
PCI-E 6-Pin	4	4	4	6	8
Main 12V	1	1	1	1	1
8-Pin EPS12V	2 (4+4)	1	1	1	1
4-Pin 12V	4	1	1	2	2
SATA	9	8	11	12	16
Molex 4-Pin Peripheral	5	8	5	7	7
Floppy 4-Pin	1	1	1	1	1
Finish	Matte black (textured)	Matte black	Glossy titanium	Matte black (textured)	Matte black (textured)
Length including cable bend (inches)	10	8.5	7	9	9
Warranty (years)	5	5	3	3	3
Price	$199	$159	$159	$289	$325
CPU Rating	●●●◖	●●●●	●●●◖	●●●●◖	●●●●◖

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

note, but for the money, you'd be hard-pressed to find a better PSU.

Enermax MODU82+ 625W

The MODU82+ 625W is one of Enermax's midrange, modular PSUs. The unit is physically the smallest we tested in this round-up, coming in at about 7 inches long. It's diminutive physical attributes, however, don't mean it's light on features. The MODU82+ 625W is SLI- and 80 Plus Bronze-certified, it sports a triple-12V rail design, with each offering up to 25A of power, and its enclosure is adorned with an attractive, glossy titanium finish. The unit's variable speed, 120mm cooling fan also proved to be very quiet, and its modular cabling and relatively small size make it an attractive option for case modders.

Although the load placed on the unit by our powerful test machine flirted with the MODU82+ 625W's maximum output rating, it handled the load with aplomb. We never experienced any instability with the test system or the voltage output on the unit's rails. If 625W is enough power for your system, and the MODU82+ 625W's size and modular cabling are appealing to you, we definitely suggest checking this unit out.

Enermax Revolution 85+ 850W

Enermax touts the Revolution 85+ series as a "revolution of PSU design and performance." We don't know if these power supplies are going to start any revolutions, but they are certainly

MODU82+ 625W
$159
Enermax
www.enermaxusa.com
●●●◖

Revolution 85+ 850W
$289
Enermax
www.enermaxusa.com
●●●●◖

In Win Commander 850W	In Win Commander 1200W	OCZ Fatal1ty 700W	OCZ ModXStream Pro 700W	Silverstone Strider 600W	Silverstone Element 750W	Silverstone Olympia 800W
850	1,200	700	700	600	750	800
850	1,200	878	719	600	750	800
4	4	1	2	2	2	1
18 (x2), 30 (x2)	20 (x2), 36 (x2)	56	50 (2x 25)	64 (2x 32)	60 (35+25)	66
30	30	30	25	30	30	30
30	30	28	25	30	25	28
Yes	Yes	Yes	Yes	No	No	No
No	No	No	No	Yes	No	Yes
587	589	591	592*	588*	588	585
59	60	61	60	59	59	60
0.99	0.99	0.99	0.99	0.99	0.99	0.99
Up to 88%	Up to 88%	82%	82%	80 to 85%	82 to 85%	80%+
Yes	Yes	Yes	Yes	Yes (Bronze)	Yes (Bronze)	No
Yes	Yes	No	Yes	Yes	No	No
Motherboard	Motherboard	Motherboard	Motherboard	Case	Motherboard	Motherboard
140mm	140mm	120mm	135mm	135mm	135mm	120mm
2 (6+2)	3 (6+2)	2 (6+2)	2 (6+2)	1	1 (6+2)	2
2	3	2	2	4	4	4
1	1	1	2	1	1	1
1 (4+4)	2 (1x 4+4)	1 (4+4)	1	1	1	1
2	2	2	1	1	1	1
8	10	8	6	6	6	6
7	8	8	4	6	6	6
1	2	1	2	2	2	2
Matte military green	Matte military green	Matte black	Matte titanium	Matte black	Matte black	Matte black
7.5	9.5	8	7.5	8.5	8	7.5
3 (limited lifetime with registration)	3 (limited lifetime with registration)	3	3	3	3	3 Years
$235	$319	$129	$105	$105	$130	$179
●●●◖	●●●●	●●●	●●●◖	●●●	●●●●	●●●◖

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Revolution 85+ 1050W
$325
Enermax
www.enermaxusa.com
● ● ● ● ◖

Commander 850W
$235
In Win
www.inwin-style.com
● ● ● ◖

Commander 1200W
$319
In Win
www.inwin-style.com
● ● ● ●

Fatal1ty 700W
$129
OCZ
www.ocztechnology.com
● ● ●

the most advanced units in Enermax's stable. In addition to all of the most sought after features, such as high-efficiency modular cables, near-silent operation, and good looks, the Enermax Revolution 85+ series of power supplies complies with EPS12V 2.93 specifications, fully supports C6 low-power states, and can operate with 0A minimum loads on all outputs. The Revolution 85+ series PSUs are also outfitted with 12-pin CPU power outputs in preparation for future processors that may require 10- or 12-pin leads.

Considering the unit's features and specifications, we expected the Enermax Revolution 85+ 850W to perform very well. It didn't disappoint, handling the load of our octal-core test system without issue. It remained quiet throughout testing, and voltage output on all of its rails was rock-solid. It's not all good news, though.

The forward-looking features and excellent performance that make the Revolution 85+ 850W so attractive also increase its price significantly. In fact, this unit is about $130 more expensive than Corsair's TX 850, which has a similar maximum output rating. Despite its relatively high price, though, we're still giving the Enermax Revolution 85+ an excellent rating. This is one of the best power supplies on the market, and it deserves to be recognized as such.

Enermax Revolution 85+ 1050W

What happens if you take the excellent Enermax Revolution 85+ 850W and increase its maximum output rating to 1,050W? As its name implies, the Revolution 85+ 1050W is virtually identical to the 850W unit. In fact, the only differences are the maximum combined outputs offered by the units' six 12V rails (the 1050 can handle an 87A combined load, whereas the 850 supports up to 70A) and the number of PCI-E power connectors (the 1050 has two more). Other than those two differences, however, there isn't much to report. Both are CrossFire-certified and SLI-ready, and both are 80 Plus Silver-certified and have quiet 135mm fans.

As you probably expect, the 1,050W Revolution 85+ had no trouble with it either. The Revolution 85+ 1050W is everything the 850W unit is, with an increased output rating and higher price.

In Win Commander 850W

In Win is a brand that has a long, storied history in the enthusiast space. The company has been building desktop and server chassis for almost 23 years and has recently introduced a new lineup of power supplies, dubbed Commander, which cater to power users and gamers alike.

The Commander 850W unit is SLI- and 80 Plus-certified, it is outfitted with four 12V rails, and it sports a massive, quiet 140mm fan for cooling its internals. As the Commander branding suggests, the PSU has a military theme, evidenced by its matte, camo-green, textured finish and bold yellow lettering. The unit is relatively small at about 7.5 inches long (including cable bend), and it features mostly modular cables.

During testing, the In Win Commander 850 handled everything our Skulltrail-based test system could throw its way without incident. It's not flashy, and its price falls between the other two 850W units in this roundup, but the In Win Commander 850W is worth a look if you're in the market for a solid workhorse of a PSU with a great warranty.

In Win Commander 1200W

Although they are in the same product family and feature the same branding, the In Win Commander 850W and 1200W are fairly different products. Obviously, the 1,200W unit has a higher output rating. In fact, it's the most powerful unit we tested in this round-up. The In Win Commander 1200W achieves its higher output by running two 20A and two 36A 12V rails. The Commander 1200W is also about 2 inches deeper than the 850W and is outfitted with more PCI-E, SATA, 8-Pin EPS12V, and 4-pin Molex peripheral power connectors.

In terms of performance, the In Win Commander 1200W is also a winner. Nothing we could run on our test rig could bring this PSU down, and its cooling fan remained nice and quiet throughout testing. At about $320, the Commander 1200W's price is competitive with other quality >1KW units on the market. Like its 850W counterpart, registering on the company's Web site upgrades the PSU from a three-year to a lifetime warranty.

OCZ Fatal1ty 700W

Johnathan Wendel's "Fatal1ty" handle has been used to promote everything from motherboards to sound cards. Now we can add power supplies to the list, courtesy of OCZ. The OCZ Fatal1ty 700W is a very affordable PSU targeted at gamers on a budget who are also looking to add a bit of bling to their rigs. The non-modular unit features a single 12V rail for maximum compatibility. It's SLI- and 80 Plus-certified. There is a red, lighted 120mm cooling fan on the unit's underside.

During testing, the Fatal1ty 700W never caused any system instability and

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

ModXStream Pro 700W
$105
OCZ
www.ocztechnology.com
●●●◖

Strider 600W
$105
Silverstone
www.silverstonetek.com
●●●

Element 750W
$130
Silverstone
www.silverstonetek.com
●●●●

Olympia 800W
$179
Silverstone
www.silverstonetek.com
●●●◖

took everything our 8-core rig could muster. We did, however, see voltage on the 5V rail dip just barely below 5V (4.96 to be exact) under load, but it never caused any stability issues. We should also note that the unit's cooling fan had a slightly audible whine, but all it takes is a midrange graphics card's fan to drown it out.

It's not a record breaker, but at less than $130, the Fatal1ty 700W is worth a look if you need a good PSU on a relatively tight budget.

OCZ ModXStream Pro 700W

The OCZ ModXStream Pro 700W is an affordable power supply with a number of attractive features. It sports a dual-12V rail design with modular cabling and a compact enclosure complete with a relatively large, and quiet, 135mm cooling fan. The unit is also SLI- and 80 Plus-certified, and it features an aesthetically pleasing metallic titanium finish that would look good in any system.

We did, however, experience an issue during testing. As was the case with the Silverstone Strider 600W, our octal-core test machine spontaneously rebooted once while testing the OCZ ModXStream Pro 700W under heavy load after running under a sustained heavy load for approximately half an hour. The unit didn't sustain any damage, however, and we couldn't replicate the issue. Regardless, the overwhelming majority of desktop systems in existence won't consume as much power as our test rig, and at just barely $105, the OCZ ModXStream Pro 700W is a good value.

Silverstone Strider 600W

Although the Strider (model ST60F) 600W power supply has technically been on the market since 2006, Silverstone has revised the unit a few times to enhance its features and performance. The latest version of the Silverstone Strider 600W, which is the model we tested, was introduced sometime around the middle of 2008, and it brought with it some noticeable improvements in a few key areas. First, this latest Strider 600W is more compact than its predecessors: It's about 0.75 inch shorter. It is also quieter, due to the inclusion of a 135mm fan. (Previous models used a 120mm.) The latest Strider 600W is more efficient, as well; it now boasts an 80 Plus Bronze certification.

Although we found the Strider 600W to be a quality PSU, especially considering its low price, it did exhibit an issue during testing. After about 20 minutes with a sustained >580-watt load, our test machine spontaneously rebooted. It happened only once, and the system rebooted without issue after the problem. We couldn't get it to spontaneously reboot again.

Silverstone Element 750W

The Element 750W PSU is a new addition to the company's Element line of power supplies. Efficiency is the focus with the Element series, and as such, the Silverstone Element 750W unit has earned itself an 80 Plus Bronze certification. The unit is not SLI- or CrossFire-certified, but it does have multiple PCI-E power connectors and is multi-GPU ready.

The Element 750W features a dual-12V rail design with hardwired cabling and a quiet 135mm cooling fan. The unit is also relatively compact, and it sports a basic, matte black finish. It's not particularly exciting on paper, but in practice, the Element 750W is a winner. Performance and stability weren't an issue in our testing environment, and the unit is quiet to boot. Plus, its price is excellent considering its 750W output rating.

Silverstone Olympia 800W

The third Silverstone PSU in this roundup, the Olympia 800W (model OP800), is a decidedly different animal than the Element 750W or Strider 600W. In addition to having a higher output rating, the Olympia 800W—like the other members of the Olympia product family—features a single 12V rail design for maximum compatibility with the broadest range of components.

Despite its >80% advertised efficiency rating, the Silverstone Olympia 800W cannot boast an 80 Plus certification. It is, however, CrossFire-certified, and, of course, because of this it is SLI-ready, as well. The unit also sports a quiet 120mm cooling fan, hardwired cabling (although we should note Silverstone DA series PSUs are all modular cable versions of the OP series), and a matte black finish.

Throughout the course of our testing, the Silverstone Olympia 800W proved to be a rock-solid performer. While operating under a sustained workload for over an hour, the Olympia 800W never stumbled, and the test system remained perfectly stable. Output on the unit's 3.3V, 5V, and 12V rails was similarly stable, according to our multimeter, and throughout the entire process, the unit's cooling fan remained quiet. At about $179, the Silverstone Olympia 800W is priced somewhat high in light of competing offerings, namely the Corsair TX 850, but this is a quality PSU nonetheless. ▲

by Marco Chiappetta

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Western Digital WD TV HD vs. Seagate FreeAgent Theater

Which Box Is Best For Your Home Theater?

WD TV HD Media Player
$129.99
Western Digital
www.wdc.com
●●●

FreeAgent Theater
$129.99
Seagate
www.seagate.com
●●●◖

Most of us want some easy and effective way to get our media files from our PCs to our TVs. Western Digital and Seagate think they finally have an answer for the masses.

Western Digital WD TV HD Media Player

Styled much like a small MyBook, the WD TV HD offers two USB ports, S-Video, HDMI, optical SPDIF, composite video, and RCA stereo jacks—a good mix for a media-savvy audience. You simply dump your media files to any USB storage device, plug it into the media unit, and connect the WD TV HD to your home theater. It supports video up to 1080p and decodes H.264, paving the way for coming video content.

The WD TV HD's UI smacks of traditional, glossy MCE interfaces, relying on the remote's arrow controls to move up and down through modes (Videos, Photos, Music, Settings) and sideways through metadata filters (most recent, date, genre, etc.).

The UI offers a setting to make most icons into thumbnails, which comes in handy for browsing photos and videos. Although the WD saves these thumbnails to your storage source, the initial indexing can take a long time. The FreeAgent Theater is faster but doesn't save thumbnails.

Finding specific files on the WD TV HD can be arduous. You can't see a filename until you highlight its icon. This is WD's biggest flaw. The slick UI that makes the player so sexy also makes it cumbersome. In reality, it takes about the same amount of time to locate an item on either player. And quirks such as using Folder View, not Album View, to play an album in its proper order show there's room for further UI tuning.

Seagate FreeAgent Theater

We received a slightly flawed preproduction model of the FreeAgent Theater. In particular, the audio quality on our unit was so weak and noisy that Seagate concluded the unit was defective. Similarly, despite the click of a FreeAgent Go drive when it docks with the Theater and the presence of an eject button, we discovered that merely tilting the dock forward 90 degrees would let the FreeAgent Go slide out. These things should be fixed in the final version.

There's more to Seagate's convoluted UI than meets the eye. Although WD is about the GUI, Seagate decided that real media collectors use intelligent folder organization to tame their content. Thus the Theater bases its UI on hierarchies. We didn't like how Seagate tried to blend hierarchies with mode (Video, Photo, etc.) filters across the top of the screen, but we finally admitted that it was easier to locate files with Seagate because the file organization matched our own rather than being an alphanumeric, metadata-driven mess.

Specs (WD TV HD Media Player): Outputs: HDMI, Composite A/V, optical SPDIF
Specs (FreeAgent Theater): Outputs: Component video, Composite A/V, coaxial SPDIF

The Theater sports two USB ports. It tops out at 1080i component video and coaxial SPDIF rather than HDMI and optical audio. Seagate also embraces DivX while ditching H.264. Still, DVD rips remain the Theater's single best feature. Just browse to a folder containing a ripped disc's files, and a small thumbnail version of the video starts playing in the right half of the UI. Pressing Play on the remote launches a fullscreen version of the video at its beginning, and Seagate's remote even lets you surf through disc menus and add subtitles. WD's unit will only play individual VOB files.

Often, you have to dig deep to find the FreeAgent Theater's advantages. For example, the Theater also has a Thumbnail mode for pictures, but you have to be in Photo mode and select Options to enable it. WD slideshows always fade to black between images, but because the Theater loads two photo streams, images can crossfade. With default settings, the Theater is far worse than the WD TV HD at upscaling small photos, but the Theater will re-render photos with each zoom step. In other words, Seagate is drastically better for seeing detail in 10MP or 12MP images.

As an idiot-proof photo player, we'd give Western Digital the advantage; plus, we prefer its ports and codec compatibilities. But for quality photo displaying and the video content commonly stored today, Seagate's FreeAgent Theater emerges as the better device. ▲

by William Van Winkle

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

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Not responsible for typographical errors.

Verbatim TuneBoard Speaker Keyboard

Specs: Dual stereo speakers (5W max power, 3W rated power); 15 LED backlights; USB 2.0 connectivity; integrated Bass Boost

TuneBoard Speaker Keyboard
$69.99
Verbatim
www.verbatim.com
●●◖

If you weren't previously aware, Verbatim, maker of all things storage-related, also sells several types of accessories, many of which are also storage-related (CD/DVD cases, disc cleaners, memory card readers, etc.). Two accessories the company crafts, however, have seemingly nothing to do with storage, straying into the realm of keyboards and mice. Among Verbatim's various laser, optical, desktop, notebook, Bluetooth, multimedia, and Vista-centric input devices, you'll find the new TuneBoard Speaker Keyboard an odd yet intriguing example that convergence is alive and well.

By now, you've guessed the "Speaker" portion of the TuneBoard's name means Verbatim integrated speakers into this board's piano-black, ultra-sturdy frame. But beyond the two 5W (max power) stereo speakers underneath a matching black grille at the board's top, there's an integrated microphone (which handled my Skype and video chat sessions surprisingly well); media control buttons (Play/Pause, Stop, etc.); and an oversized, round Bass Boost button (you'll want to leave it enabled). Further, mic and headphone jacks sit at the board's front side, and an Illuminate button toggles neon-blue backlighting off and on. One USB 2.0 cable draws power for everything. Verbatim sells Windows and Mac versions; I controlled WMP, iTunes, and Media Monkey content without problem on a Windows model.

Typing-wise, other than smallish keys (in relation to my largish fingertips), the TuneBoard is an appreciatively quiet ride. Given the speakers' power constraints, however, it's not surprising volume maxed out quickly and playback of MP3, WAV, and WMA files; audio CDs; DVD movies; and YouTube, Hulu, and other online video lacked warmth and was hollow, particularly at the midrange and low end. The Bass Boost rounds things out, but we're not talking Klipsch here.

Knowing this, exactly who'll desire a keyboard with speakers that can't match most low-end desktop speakers on most fronts is the million-dollar question. Verbatim suggests it's those seeking a "personal music station" that also clears clutter. I'd suggest if you're building a new rig, don't have high-end audio tastes, and want to absorb two pieces of hardware into one device that should last many years, you're a candidate. ▲

by Blaine Flamig

Chieftec HM-03

HM-03
$319.95
Chieftec
www.chieftec.com
●●●●

Specs: Dimensions: 3 x 13.2 x 12.6 inches (HxWxD); Bays: 1 5.25-inch external, 2 3.5-inch internal; Ports: 2 USB, 1 FireWire, audio, 56-in-1 card reader; available in black and silver

The HM-03B is the smallest form factor in Chieftec's latest Hi-Fi line of home-theater PCs. Each enclosure—the HM-01, HM-02, and HM-03—is designed to correspond with the components in your home entertainment room. We assembled the low-profile model that's just roomy enough to support a mATX board.

Beginning with the aluminum exterior, the HM-03 keeps it classy with a brushed finish. In terms of structure, it's roughly between the size of a Blu-ray Disc player and a large receiver. More noticeable, however, is the lack of vents: There are a total of three, one of which is appropriated for a single 80mm fan installed directly next to the hard drive cage.

The top panel is secured by four small screws. The anterior corners do include two small springs to help you remove the panel easily. Inside, we also found the SoundGraph iMon VFD software and HTPC remote conveniently packaged in individual plastic compartments. On the remote, you'll see command-based buttons, an input device simulator, and other common buttons. Specifically, there is an application launcher, right-click function, and mouse/keyboard button.

The best feature, by far, was the inclusion of the preinstalled APS-400S PSU (optional). The rest of the installation was very nearly as simple as what the PSU required. With the help of multiple toolless, shockproof screws, we could easily slide both the optical drive and HDD into place. During the test run, we noticed how incredibly quiet the whole machine was.

The front interface is understated: I/O ports are hidden with a pop-down door, and the VFD is in no way flashy. There's no gimmick to the power switch. The volume and navigation knobs are a bit bulky but not overwhelming.

There's truly not much to dislike about Chieftec's case, save for the lack of vents. The HM-03 would hold its own next to the majority of HTPCs on the market. ▲

by Joanna Safford

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Vigor Gaming Force Recon T7a

The Vigor Gaming Force Recon T7a is the first X58 system to hit our test bench with an overclocked Intel Core i7-965 Extreme processor. The 3.9GHz overclock, combined with two factory-overclocked MSI Radeon HD 4870 X2 graphics cards running in CrossFireX, give this system the power to push out some of the highest frame rates we've seen in our gaming benchmarks. In fact, the Force Recon T7a required so much power that we had to connect the system directly to the wall outlet after it repeatedly shorted out our cheap power strip.

The hardware inside Force Recon T7a is a short list of the latest and greatest components available. Vigor Gaming builds off of Intel's DX58SO Extreme Series motherboard by adding 6GB of Kingston HyperX DDR3-1800MHz triple-channel memory. The MSI R4870X2-T2D2G-OC graphics cards feature a 780MHz GPU clock (30MHz higher than stock) but are otherwise similar to ATI's reference design. For storage, the Force Recon T7a features an 80GB Intel X25-M SSD, which is where Vigor installed Windows Vista Premium 64-bit, as well as two 1TB Western Digital Caviar Green drives running in RAID 0. An Antec TruePower Quattro 1000 PSU delivers the system's power.

The artistic design of the system is subtle but impressive. The Vigor Gaming Mammoth case includes three 120mm low-rpm fans with blue LEDs, which you can see through the chassis' wire mesh front panel. Additionally, Vigor's Monsoon III CPU cooler includes blue LEDs in both of its fans. The system lighting highlights Vigor Gaming's organized cable routing and hardware choices. Vigor also etched a small, silver Vigor Gaming logo onto our test system; it adds a classy look. To vent air out of the case, the Force Recon T7a also features a 300mm fan at the top of the case, a see-through plastic mesh side panel near the two GPUs, and two 120mm rear exhaust fans. The mesh and multifan design effectively kept air flowing, but it also made the Force Recon T7a exceptionally loud.

Force Recon T7a
$4,400 (as tested)
Vigor Gaming
www.vigorgaming.com
● ● ● ●

After running the overclocked system overnight through Prime 95's stress tests, (which the Force Recon T7a passed with flying colors) the boutique PC sprinted through most of our test bed. In particular, its 12784 Overall score in PCMark Vantage, P23386 Overall score in 3DMark Vantage, and 20GBps Memory Bandwidth results in SiSoft's Sandra Lite XII are record setters. And although 27.7fps in Crysis and 16.9fps in Crysis Warhead aren't records, both are high frame rates. The 80GB Intel X25-M SSD and 1TB Western Digital Caviar Green hard drives also showed well with a 25589 HDD score in PCMark Vantage.

Besides solid hardware choices and stable overclocks, the Force Recon T7a includes several additions—including attractive system lighting and thoughtful design—that make it more than the sum of its parts. If you're looking to jump into Intel's Nehalem platform, Vigor Gaming's Force Recon T7a is good choice for power users. ▲

by Nathan Lake

Vigor Gaming Force Recon T7a

3DMark Vantage	
Overall	P23386
GPU	23536
CPU	22948
Cinebench 10*	
Multithreaded (score)	21387
Multithreaded (min:sec)	0:41
POV-Ray 3.7 Beta**	4525.81
PCMark Vantage Pro 1.0	
Overall	12784
Memories	8456
TV & Movies	5811
Gaming	16402
Music	12964
Communications	9422
Productivity	14529
HDD	25589
SiSoft Sandra Lite XII SP1	
Processor Arithmetic	
Dhrystone ALU (MIPS)	90,390
Whetstone iSSE3 (MFLOPS)	77,799
Processor Multimedia	
Integer x8 iSSSE3 (itps)	621,051
Floating Point x8 iSSE2 (itps)	419,071
Memory Bandwidth	
Integer Buffered iSSE2 (GBps)	20.70
Floating-Point Buffered iSSE2 (GBps)	20.83
WinRAR 3.71*	1:16
Crysis Warhead (4XAA)	16.9
Crysis 1.1 (4XAA)	27.7
World In Conflict 1.005 (4XAA, 16XAF)	60
FarCry 2 (4XAA)	21.1

** minutes: seconds*
*** pixels per second*
Games tested at 2,560 x 1,600

Specs: Intel Core i7-965 Extreme @ 3.9GHz; Motherboard: Intel DX58SO; RAM: 6GB Kingston HyperX DDR3-1800MHz; HDDs: Intel X25 SSD, 1TB Western Digital WD10AEDS (x2; RAID 0); GPU: MSI 4870X2-T2D26-OC (CrossFireX); PSU: Antec TruePower Quattro 1000 (1,000-watt); OS: Windows Vista Home Premium 64-bit

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

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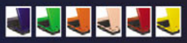

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AeroCool AeroRacer Pro

For most of us, the shell of our high-end system is just as significant as the components inside, and we want a distinctive chassis that stands out among the other LAN-party builds.

AeroCool's AeroRacer Pro has plenty of useful features and noticeable traits that are sure to turn heads at your next gaming event. The most prominent feature is the 400mm fan that covers the entire side panel, looking as though someone fastened on a ceiling fan for kicks. The intake fan pulls air up to 250cfm and acts as the main cooler for the case. Because of the fan's size, it only spins at 400rpm and ran quieter than most of the 120mm-equipped cases we see. Installing the optional 120mm rear fan (not included with the case) naturally upped the noise level, but not by much.

Perhaps it wasn't an accident that the AeroRacer Pro's aesthetics reminded us of a racecar, especially with its "Engine Start" power button and the leather-like finish on the drive bays and lower front panel. The front bezel is a glossy-black plastic that seems a little out of place and is tough to open. A magnetic closure would have been better. The side fan also adds to the racecar feel, as it resembles a stylized hubcap.

Each of the four 5.25-inch, 3.5-inch, and the single floppy bays are tool-less with a slide-and-snap design. The tool-less features were easy to use and held the hard drives and optical drives securely in place. Overall, building with the AeroRacer Pro was a stress-free experience. There was plenty of room for an ATX motherboard and a 7.5-inch power supply. We had no problems fitting a 9-inch graphics card in one of the seven expansion slots, and if you forgo filling one of the hard drive bays, you may be able to squeeze in a 10.5- or 11-inch card, depending on its shape.

The AeroRacer Pro is a unique, eye-catching chassis that makes the building process quick and easy. Its midtower form factor is perfect for LAN travel, and its cooling style is one-of-a-kind. ▲

AeroRacer Pro
$99.99
AeroCool
www.aerocool.com.tw
● ● ● ●

Specs: Bays: 4 5.25-inch external, 4 3.5-inch internal; 1 3.5-inch external; Fans: 1 400mm, optional 80mm, 92mm, or 120mm. Front ports: 2 USB, Audio I/O.

by Kris Glaser

T-Mobile G1

G1
$399.99 (No Contract)
T-Mobile
www.t-mobileg1.com
● ● ● ◖

Specs: 5.6 ounces; 4.6 x 2.16 x 0.62 inches (HxWxD); 802.11b/g; GPS; Bluetooth 2.0; 3.7-inch color touchscreen; Qualcomm MSM7201A processor; GSM/GPRS/EDGE/Wi-Fi and UMTS/HSDPA; 1GB preinstalled microSD card; microSD expansion slot

There was lots of buzz surrounding the T-Mobile G1 when it was introduced in October 2008, and it didn't disappoint me. Android, the open-source mobile platform developed by Google, is easy to navigate and has opened the door for developers to add lots of free applications to the Android Market, which makes the platform more appealing.

For those who regularly use Google applications, the G1 includes one-touch Google applications, such as Gmail, Google Calendar, Google Maps Street View, YouTube, and more. You can add most POP3 or IMAP email services to the G1, and you can chat using AIM, Windows Live, or Yahoo! Messenger.

In addition to T-Mobile's 3G (HSDPA) and EDGE networks, the G1 supports Wi-Fi and Bluetooth. Access to the 3G and EDGE networks is a bit dodgy where I live, but I could connect to the network most of the time (even though it wasn't usually full strength).

HTC manufactured the G1 phone; Synaptics took care of the capacitive touchscreen technology. The touchscreen is fairly receptive, but sometimes it was difficult to scroll up and down using the glide of a finger without accidentally opening an application, and sometimes the screen didn't scroll when I wanted it to. I did like the slide-out QWERTY keyboard because my fingers didn't feel crowded, which made it easier to press the right keys.

The buttons are small, but spaced out enough that I didn't run into problems pressing more than one key at a time. The G1 also includes a home button and a trackball that's useful for navigational purposes.

The G1 is definitely a challenger to other popular touchscreen smartphones, such as the iPhone and the BlackBerry Storm, thanks to its ease of use, the preloaded applications, and the applications available through the Android Market. It's geared more toward consumer use than business use, which is something to keep in mind if you are considering it as your next (or first) smartphone. ▲

by Tessa Warner Breneman

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ● ● ◖ **2.5 = ABSOLUTELY AVERAGE** | ● ● ● ● ● **5 = ABSOLUTELY PERFECT**

BFG Technologies GeForce GTX 285 OCX

GeForce GTX 285 OCX
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Benchmark Results

	BFG GeForce GTX 285 OCX	BFG GeForce 295 OCX
3DMark Vantage		
Overall	P13835	P17470
GPU	17308	17549
CPU	12968	17237
GPU Test 1*	39	52
GPU Test 2*	37	51
Crysis 1.1 (no AA)*		
1,920 x 1,080	28.2	38.9
2,560 x 1,600	17.4	25.8
Crysis Warhead (4XAA)*		
1,920 x 1,080	37.04	43.74
2,560 x 1,600	22.6	27.2
Far Cry 2 (4XAA)*		
1,920 x 1,080	45.3	48.4
2,560 x 1,600	37.4	62.6
World In Conflict 1.005 (4XAA, 16XAF)*		
1,920 x 1,080	52	61
2,560 x 1,600	37	47

** frames per second*

Test system specs: 2.66GHz Intel i7-920; MSI X58 Eclipse motherboard; 3GB DDR3-1600, 74GB WD Raptor; Corsair HX1000W PSU; GeForce ForceWare release 181.20
Specs: GPU: GeForce GTX 285; Core clock: 702MHz; Shader clock: 1,584MHz; Memory: 1GB DDR3 (1,332MHz; 240 shader processors)

Nvidia began 2009 by releasing the GeForce GTX 295 (see page 46 in the March 2009 issue) and the GTX 285. The dual-GPU GTX 295 reclaimed the single-card performance title over the AMD 4870 X2. BFG sent us its GeForce GTX 285 OCX and we tested to see if the GTX 285 could secure the title of world's most powerful single GPU, if only for a little while.

The GeForce GTX 285 is a refresh of Nvidia's GTX 280. One of the biggest differences between the two is that the GTX 285 was manufactured using a 55nm fabrication process, which allowed Nvidia to reduce the board power from the GTX 280's 236W to 183W. The lower power requirements mean that you'll only need a pair of 6-pin PCI-E power connectors, rather than the GTX 280's 6-pin and 8-pin PCI-E power feeds. In terms of stock clock differences, the GTX 285 bests the GTX 280 in core clock (648MHz vs. 602MHz), shader clock (1,476MHz vs. 1,296MHz), and memory clock (1,242MHz vs. 1,107MHz). Otherwise, the GTX 285 includes the same 240 stream processors, 80 texture-filtering units, 32 ROPs, and 1GB of GDDR3 memory.

The BFG GeForce GTX 285 OCX jumps the core clock 702MHz, the shader clock to 1,584MHz, and the memory clock to 1,332MHz. A 512-bit memory interface provides a total memory bandwidth of 170.5GBps. As a point of reference, the popular GeForce 9800 GTX offers a 256-bit memory interface and a 70.4GBps memory bandwidth. The dual-slot GTX 285 is 10.5 inches long and includes Nvidia's heat shroud, which BFG emblazoned with its logo and a tattooed, ill-tempered looking fellow.

BFG includes an HDMI adapter, but if your home theater doesn't have HDMI inputs, you could also use the card's 7-pin HDTV-out port. Either way, you'll need to connect an audio pass-through cable to run audio over the HDMI or component connection.

The GTX 285 slightly surpasses the GTX 280 (the previous single-GPU champ) in our tests, but it does lag behind the dual-GPU ATI HD 4870 X2, based on our most recent tests. The BFG GTX 285 OCX posted 17.43fps in Crysis at 2,560 x 1,600, which isn't too far behind BFG's GeForce GTX 295 OCX's 25.8fps. The single-GPU GTX 285 OCX posted playable frame rates at 1,920 x 1,080 in Crysis Warhead, Far Cry 2, and World In Conflict. In 3DMark Vantage, the GeForce GTX 285 OCX posted a 17308 GPU score; when we backed it down to Nvidia's stock clock settings, the card delivered a 15222 GPU score.

Compared to the GTX 280, the reduced power draw and performance enhancements of the GTX 285 are ideal for those looking to set up a 2- or 3-Way SLI configuration. The addition of BFG's overclocks only increases the performance value and appeal. ▲

by Nathan Lake

Evga GeForce GTX 285 SSC Edition

Upon launching the GeForce GTX 285, Nvidia took what was already the fastest single-GPU card on the market, the GTX 280, and spruced it up with a more power-friendly GPU.

And as is typically the case when Nvidia launches a new GPU, board partners were at the ready with factory overclocked models that kick performance up a notch. Evga chimes in with its GeForce GTX 285 SSC Edition, which sports a 702MHz core, 1,584MHz shader, and 1,323MHz memory clocks. Nvidia's reference specs call for only 648MHz, 1,476MHz, and 1,242MHz clocks (core/shader/memory, respectively), so Evga's offering will undoubtedly outperform any reference model GTX 285.

The GeForce GTX 285 SSC ships with the typical complement of accessories and cables/adapters. There were no games bundled with the GeForce GTX 285 SSC, but Evga did include a coupon for a 10% discount on up to five games or CUDA-enabled applications through nZone (nzone.com).

The Evga GeForce GTX 285 SSC Edition doesn't ship with an outlandish accessory bundle, but its specifications and lifetime warranty certainly stand out. If you have the itch to upgrade your graphics card, you could do much worse than this overclocked offering. ▲

by Marco Chiappetta

GeForce GTX 285 SSC Edition
$424.99
Evga
www.evga.com
●●●◖

Specs: GPU GeForce GTX 285; Core clock: 702MHz; Memory: 1GB GDDR3 (1,323MHz); Memory interface: 512 bit; 240 stream processors; lifetime warranty

Test system specs: 3.2GHz Core 2 Extreme QX9770, Asus Striker II Extreme (nForce 790i SLI Ultra), 4GB DDR3-1333, Windows Vista Ultimate SP1 (32-bit); Drivers: Nvidia ForceWare v180.87 (w/ DirectX November 2008 Redist)

Benchmark Numbers

3DMark Vantage (Enthusiast Preset)	
Overall Score	6513
GPU Test 1	21.03
GPU Test 2	15.4
1,920 x 1,200	
Left 4 Dead (4XAA/16XAF)	125.84
Enemy Territory: Quake Wars (4XAA/16XAF)	105.7
Unreal Tournament 3	111.12
Crysis (Very High Quality)	30.29
2,560 x 1,600	
Left 4 Dead (4XAA/16XAF)	85.47
Enemy Territory: Quake Wars (4XAA/16XAF)	71.6
Unreal Tournament 3	73.37
Crysis (Very High Quality)	18

NZXT Avatar Gaming Mouse

Hardcore gamers know the benefits of using a high-quality gaming mouse. They track better on more surfaces, react more quickly, have multiple programmable buttons, and are generally more durable and well-built than generic mice. In addition to offering all of the aforementioned benefits, NZXT's Avatar gaming mouse also features an ambidextrous design, adjustable DPI settings, sleek aesthetics, and a rubberized grip that prevents slippage during intense gaming sessions.

Oversized Teflon feet on the seven-button Avatar's underside also help the mouse slide effortlessly over most surfaces. Unfortunately, the nearly symmetrical, elongated design isn't very comfortable for those with large hands, and the positioning of the thin side-mounted buttons forced numerous accidental clicks when picking up the mouse to reposition it.

The NZXT Avatar is definitely a looker and performed well in every game I tested, but poor button positioning and an uncomfortable design ultimately mar its appeal in light of competing offerings from Razer, Logitech, and Microsoft. ▲

by Marco Chiappetta

Specs: Interface: USB; Hand orientation: Ambidextrous; Tracking method: Optical; Buttons: 7; Maximum resolution: 2,600dpi (adjustable to 650, 800, 1,300, 1,600, and 2,600dpi); Sensor: 5.8MPps (max frame rate of 6,469 frames)

Avatar Gaming Mouse
$69
NZXT
www.nzxt.com
●●◖

AMD Phenom II X3 720 Black Edition

AMD's Phenom X3 series materialized to a lukewarm reception. Not all software knew what to do with a CPU sporting three cores, and the in-between nature of a triple-core chip made comparisons to dual- and quad-core alternatives tricky. But after letting its initial salvo of Phenom X3 offerings sit unaltered for almost a year, AMD unveiled a fresh round of X3 chips based on the Phenom II design.

Suddenly, triple-core is back on the map. You see, in applications optimized to run only two threads, the Phenom II X3 720's 2.8GHz clock helps it best all of AMD's other chips, save the flagship Phenom II X4 940 at 3GHz. Software able to run in more than two threads see a benefit from the third core, though naturally not as much as a quad-core chip. At a sub-$150 price point, though, AMD's only quad-core alternative is the entry-level 2.3GHz Phenom X4 9650.

Because the Phenom II X3 720 bears a Black Edition designation, enthusiasts can count on an unlocked multiplier for easier overclocking. And AMD's new 45nm manufacturing process offers significantly more headroom than its 65nm parts. With little more than a voltage increase to 1.5V, our sample was purring along at 3.7GHz.

Given its Socket AM3 pedigree and DDR3 costs, we think the Phenom II X3 720 is best-suited as drop-in replacement on an older AM2/AM2+ motherboard. ▲

by Paul Cross

Phenom II X3 720
Black Edition
$145
AMD
www.amd.com
●●●●

	Phenom II X3 720 BE (2.8 GHz)	Phenom X4 9950 BE (2.6 GHz)	Core 2 Duo E8500 (3.16 GHz)	Core i7 920 (2.66 GHz)
3DMark Vantage				
Overall Score	P12780	P12608	P12931	P10374
GPU Score	10491	10379	10671	8198
CPU Score	33679	32330	32505	41149
Far Cry 2				
1,920 x 1,200	62.62	59.67	62.62	53.18
2,560 x 1,600	47.95	47.02	49.11	41.78
PCMark Vantage				
Overall	4182	4477	4840	5128
Memories	4259	3945	4583	5394
Productivity	4563	4374	4706	5128
HDD	2929	2554	3239	3317
Mainconcept	3:05	2:44	4:03	1:43
Xvid Encoding*	4:09	5:05	3:20	3:07
Sandra Memory Bandwidth				
Integer Buffered iSSE2	7.80GBps	10.60 GBps	6.62GBps	18.80GBps
Floating-Point Buffered iSSE2	7.85GBps	10.57GBps	6.64GBps	18.79GBps
**Minutes:seconds*				

Specs: Core clock: 2.8GHz; 6MB L3 cache; Socket AM3 (AM2/AM2+ compatible); integrated DDR2/DDR3 memory controller

Nvidia GeForce 3D Vision

3D stereoscopic LCD shutter technology isn't new. In fact, the technology has been around for many years; back in the day, it was even included with some ancient GeForce graphics cards produced by Elsa. Nvidia's recently released GeForce 3D Vision package, however, takes the best of what's out there for the PC and enhances it with numerous features specifically designed for hardcore gamers.

The GeForce 3D Vision is composed of a pair of rechargeable, wireless LCD shutter glasses; a base station with an integrated IR transmitter; and the drivers, software, and cables necessary to connect them to a PC. The glasses use relatively high-quality optics and offer better viewing angles than most passive products. And they can be used for up to 40 hours on a single charge.

The base station uses IR beams to sync with the glasses, and an easy-to-use dial that alters the effective depth of the 3D effect, which makes it easier to get acclimated to 3D viewing. The whole kit is compatible with GeForce 8-, 9-, or GTX200-series, along with hundreds of Direct3D games. But there's a catch. The GeForce 3D Vision requires a compatible 120Hz LCD monitor, 100Hz or higher CRT, or specific 3D-capable DLP or projector.

The effect produced by the glasses is excellent. RTS games are completely transformed in 3D stereo mode and feel like different games altogether. GeForce 3D Vision isn't perfect, but it is the best 3D stereoscopic technology released for the PC to date. ▲

by Marco Chiappetta

GeForce 3D Vision
$199
Nvidia
www.nvidia.com
●●●

Specs: GPU Compatibility: GeForce GTX 200 Series, 9-series (9600 GT - 9800 GX2), 8-series (8800 GT - 8800 Ultra); Interface: USB; System Requirements: Windows Vista, dual-core CPU or higher, 1GB of system memory (2GB recommended), 100MB free disk space

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

OCZ Apex SATA II 2.5" Solid State Drive

In one fell swoop, OCZ's Apex-series strives to not only set itself apart as a performance champion but also address the reservations many power users have when it comes to solid-state capacity. Apex-series SSDs ship in sizes up to 250GB while promising read speeds of up to 230MBps and writes as high as 160MBps. Numbers that lofty are normally reserved for SLC-based products, but the Apex is an MLC drive. At roughly $840, it costs about $3.30 per gigabyte. In comparison, Intel's 160GB X25-M costs about $4.50 per gigabyte.

Apex SATA II 2.5"
Solid State Drive
$839
OCZ Technology
www.ocztechnology.com
●●●●

Two JMicron storage controllers deliver what amounts to an internal RAID 0 within the diminutive 2.5-inch chassis. By comparison, Intel's X25-M (arguably the benchmark in this segment) uses a 10-channel controller to hit some of the highest read/write speeds seen from an MLC drive.

As the performance results indicate, Intel's X25-M maintains its advantage against OCZ's drive. However, Intel is at a significant capacity disadvantage. The 80GB drive we tested is far too small for a "daily use" repository, and the company's latest 160GB model is still small compared to today's 1.5TB behemoths.

As a result, OCZ's offering rises to the top of the pack with its balance of desktop-class capacity and solid-state speed. It's still expensive, but at least we're getting to the point where SSDs don't only make sense mixed in with magnetic storage. Bear in mind that in order to achieve the 250GB mark, OCZ uses a 12mm-tall chassis, which won't fit into most notebooks. ▲

by Paul Cross

Benchmark Results

	OCZ Apex 250GB SSD	Intel X25-M 80GB SSD
HDTach 3.0.4.0		
Burst Rate in MBps	229.1	253.5
Average Read in MBps	165.2	216.5
Random Access Time (ms)	0.2	0.1
CPU Utilization (%)	5	10
PCMark Vantage		
HDD Score	12473	20924

Specs: Seek: <0.3ms; Capacity: 250GB; Internal RAID 0; MTBF; 1.5 million hours; two-year warranty

Sapphire Radeon HD 4670 512MB GDDR4

AMD launched its Radeon HD 4670 in September 2008, enabling the performance of its previous flagship, the Radeon HD 3870, in a card that hovered around $100. The first Radeon HD 4670s employed 512MB of GDDR3 memory running at 1GHz to feed data to the RV730 GPU. Less expensive versions of the card used standard DDR3 at a detriment to performance. Still, the value in AMD's mainstream family was compelling.

Now, Sapphire is pushing frame rates in the other direction by arming AMD's midrange darling with GDDR4 memory, which uses less power while hitting higher clock speeds. The RV730 core, with its 320 shader processors, maintains a reference 750MHz clock, but Sapphire boosts the memory to 1.1GHz. Although that sounds like a fairly insignificant upgrade, the benchmark numbers reflect palpable gains across the board. Compared to Sapphire's own Radeon HD 4670 with GDDR3, Far Cry 2 picks up 7% higher frame rates at 1,280 x 1,024. Crysis gets an extra 10% at the same resolution.

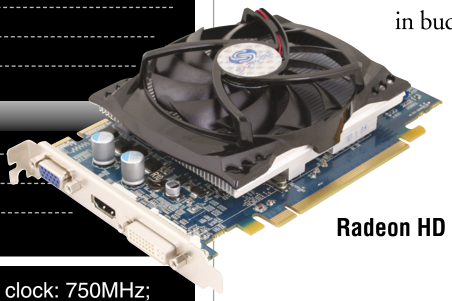
But the subtle speed increase isn't the only reason to contemplate spending an extra $10 on Sapphire's GDDR4-equipped Radeon HD 4670. The company also replaced AMD's factory cooler, which used a small, noisy fan, with a more substantial heatsink and almost-silent blower. The difference in acoustics is enormous.

We'd rather forgo that analog connection in favor of a second DVI port. Otherwise, Sapphire's enhanced Radeon HD 4670 makes for a solid upgrade in budget boxes with moderate gaming aspirations. ▲

by Paul Cross

Benchmark Results

	Sapphire Radeon HD 4670 512MB GDDR4
3DMark Vantage Overall	**P3640**
GPU Score	3178
CPU Score	6451
1,024 x 768	
Far Cry 2	66.89
Crysis (High Quality)	41.07
Call of Duty: World at War	69.48
Left 4 Dead	78.76
1,280 x 1,024	
Far Cry 2	52.66
Crysis (High Quality)	27.57
Call of Duty: World at War	52.98
Left 4 Dead	64.99



Specs: GPU: Radeon HD 4670; Core clock: 750MHz; Memory: 512MB GDDR4 (1,100MHz); 320 shader processors; Outputs: dual-link DVI, VGA, and HDMI

Radeon HD 4670 512MB GDDR4
$89
Sapphire
www.sapphiretech.com
●●●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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EUROCOM

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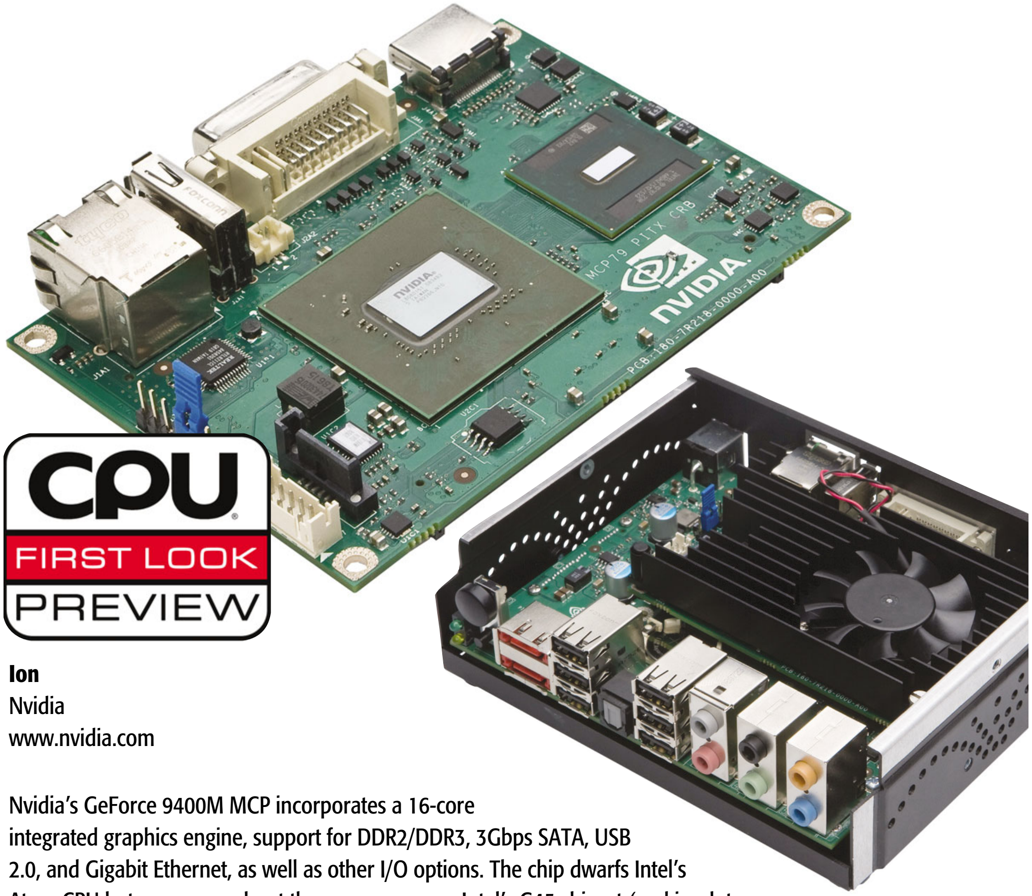
Nvidia Ion



CPU FIRST LOOK PREVIEW

Ion
Nvidia
www.nvidia.com

Nvidia's GeForce 9400M MCP incorporates a 16-core integrated graphics engine, support for DDR2/DDR3, 3Gbps SATA, USB 2.0, and Gigabit Ethernet, as well as other I/O options. The chip dwarfs Intel's Atom CPU but consumes about the same power as Intel's G45 chipset (and is a lot more capable).

If we look back in the rearview, 2008 could easily be dubbed the "Year of the Tiny." If you consider the explosion of the netbook last year, the trend to smaller, more portable designs was dramatic and well-received in the market. And though netbooks seem to be all the rage now, SFF (small form factor) PCs also have been hit with the proverbial shrink ray, as well, with offerings such as Dell's Studio Hybrid, Asus' EE Box, and a few other smaller-than-a-bread-box designs causing a buzz and re-establishing the niche.

Over the years, both Intel and AMD had a significant stake in SFF and HTPC platform offerings. As of late, Intel's low-power Atom processor seems to be pulling down design wins left and right. Surprisingly though, historically, Nvidia has had a relatively small play in this burgeoning segment.

However, at this year's CES, Nvidia stepped out with a bold statement in the form of a new SFF platform that supports Intel's Atom CPU. Though it was previewed weeks before the show, Nvidia took the opportunity to demo its new Ion platform for the world to see. Ion is a coupling of Nvidia's capable GeForce 9400M, which can be found in Apple's new generation of MacBook Pro notebooks, and Intel's aforementioned Atom. In this incarnation of a low-power, SFF PC, Atom is transformed into a much more capable multimedia CPU, enabled by Nvidia's strong integrated graphics engine at its core.

The Ion reference platform that Nvidia was demonstrating was an amazingly small palm-sized box, with a motherboard card that measures a tiny 2.8 x 3.9 inches (HxW), or about the size of a sticky note. Ports for dual-link DVI, HDMI, SVGA, one USB 2.0, and GigE are available on the motherboard. Within the confines of the Ion reference box, Nvidia also bolted on an I/O expansion board that's slightly larger than the mainboard and offers an additional six USB ports, 7.1-channel HD audio, S/PDIF, and a pair of eSATA ports. On the underside of this little fellow, Nvidia slid on a standard 2.5-inch notebook hard drive for an onboard storage subsystem.

With the assistance of full hardware offload on the GeForce 9400M for HD video processing, Ion absolutely screams HTPC. Also, though the machine could theoretically support a 500GB notebook drive, you could easily use its USB or eSATA port for storage expansion of media for streaming or direct playback. Plug in a wireless USB keyboard and mouse and the options in a home environment are endless (to say nothing of a corporate client environment or perhaps a mobile car PC application).

In terms of performance, Ion is a capable little box that clipped through some of our standard benchmarks with ease, offered a bit of light gaming, and rendered 1080p content without dropping frames. The only question mark for Ion at this time is which system partners will pick up this powerful little platform and produce it at the retail level. We're hopeful (as is Nvidia of course), although we haven't received confirmation of a product coming to market just yet. Regardless, Ion is looking small but mighty. ▲

by Dave Altavilla

Benchmark Results

	Nvidia Ion
3DMark06	**1510**
SM 2.0	537
SM 3.0	614
PCMark Vantage	**1727**
Memories	1416
Communications	1333
Gaming	1685
Productivity	1588
Call of Duty 4	
Crew Expendable (1,024 x 768; No AA)	27.21

Specs: CPU: 1.6GHz Intel Atom 330; Memory: 2GB single channel DDR3-1066; GPU; GeForce 9400M

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT by Anand Lal Shimpi

Viva Nehalem

I'll admit that I was very skeptical about Nehalem (now Core i7) upon its launch. In conventional applications, I saw everywhere from no performance increase over Penryn (Core 2 Quad) to 20%, 40%, and even 60% performance advantages. It seemed, though, that for gamers and the majority of users Core i7 just didn't make any sense; the performance improvement was there in many cases, but the platform was much more expensive.

For upgraders, I believe that assessment is still the right one. If you've got any sort of a quad-core Intel setup, you're better off overclocking than ditching the entire platform (motherboard, CPU, and memory, in many cases) for a Core i7.

For folks with older dual-core chips, or for those who are building systems from scratch, however, Core i7 is much more intriguing than I originally thought.

When I reviewed AMD's Phenom II last month, I calculated the total price premium for picking Core i7 over either Phenom II or a Core 2 Quad system. You're looking at about another $200 to pick a Core i7-920 over a Phenom II X4 940 or a Core 2 Quad Q9550. That's a pretty steep upgrade; it ends up adding another 40% to the total motherboard/CPU/memory price over either of the above options. As such, Phenom II- and Core 2 Quad-based systems are clearly the more affordable options, but it's looking more and more like Core i7 is the *right* option.

As I play with more tests and look at a wider variety of performance metrics (check out www.anandtech.com/bench for some of what I'm talking about), I'm finding that on more workloads than expected, Core i7 actually does very well. In many cases, it's fast enough that if you're building a machine today and don't plan on upgrading for two years, you're better off saving up the additional cash and getting a Core i7 over the C2Q or Phenom II. That's not to say that I'd recommend sacrificing system memory or a good graphics card if you're a gamer, but it does appear that for once we have a more future-proof architecture available as an option.

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today*, CBS' "48 Hours," and* Fortune*. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

The gaming benchmarks I've been running tell the story particularly well. If you look at Core i7 performance under titles that use older game engines like Fallout 3 (Gamebryo engine) or Left 4 Dead (Source engine), the Core i7 is competitive but not particularly impressive. With games like Far Cry 2 or Crysis Warhead, on the other hand, you see a much stronger showing. Far Cry 2, in particular, does a great job of taking advantage of multiple threads, something that Core i7 can deliver handily, thanks to Hyper-Threading.

Developers are building all of their next-generation game engines for heavily multithreaded platforms. While I suspect that we won't see the true next generation of game engines until the next generation of consoles in 2011/2012, between now and then we'll see more and more games follow Far Cry 2's lead, and we'll be grateful for more threads.

Applications are showing the same trends. Video encoding continues to be a strong selling point for multicore and multithreaded processors, but other applications are showing pretty decent performance increases on Core i7. Even some fairly basic Photoshop work does quite well on i7 from what I've seen, distancing Intel's latest from the mature, original Core microarchitecture.

If I absolutely have a fixed budget today, then I'm most likely building a Core 2 Quad or Phenom II machine. If there is flexibility and I plan on keeping this machine for a reasonable amount of time, then I think that Nehalem may actually be the right course of action. In multithreaded workloads, there's just nothing else that can come close, and the number of applications that are pushing more than a couple of CPU-intensive threads is growing.

Now if Apple would only hurry up and release a Core i7-based Mac . . . . ▲

Talk back to Anand at anand@cpumag.com

PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

Mods & Ends

Lian Li PC-A10

Lian Li's cases have been long-time favorites of the PC enthusiast community. The company's PC-A10 ($229; www.xoxidecom.com) takes many of the most sought after features, such as a slide-out motherboard tray, a hard drive vibration dampening system, and an integrated fan controller, and wraps them up in an aesthetically pleasing aluminum enclosure that's roomy enough for virtually all of today's highest-end hardware.

In addition to the aforementioned items, the Lian Li PC-A10 midtower also accommodates dual PSUs and liquid-cooling systems, a locking front bezel, and a side-mounted 120mm cooling fan that exhausts air from the case through a duct that resides just above the expansion slots. Three more fans are situated at the top, front, and back of the case to aid in cooling, and strategically located holes within the case make cable management a breeze. A total of 12 drive bays (five 3.5-inch, seven 5.25-inch) and front-mounted USB, FireWire, and audio connections round out the package. The PC-A10 is available in black or silver.

The Lian Li PC-A10 can accommodate two power supplies and features an integrated three-speed fan speed controller.

Scythe Musashi

In a tribute to famed Japanese swordsman Miyamoto Musashi, Scythe has introduced the powerful Musashi twin-fan graphics cooler ($49.80; www.scythe-usa.com). The Musashi is a relatively large graphics card cooler, measuring in at a significant 35 x 250 x 104mm (HxWxD), with dual 110mm fans capable of pushing up to 27.6cfm of air at no more than 29.22dBA. In addition to the large GPU cooler, the Musashi kit also includes a number of individual heatsinks for memory chips and other surface-mounted components, thermal paste, a case bracket with dual fan-speed controls, and a mounting bracket that can accommodate a number of Nvidia and AMD graphics cards.

According to the Scythe Web site, the Musashi is compatible with over a dozen GeForce cards, ranging from the GeForce FX 5900 to the 9800 GTX, and about 15 Radeons, from Radeon 9xxx cards (with the exceptions of the 9550 and 9600) to the HD 4870. With its gigantic heatsink and dual fans, the Musashi may be a perfect fit for enthusiasts looking to quiet and overclock their graphics cards.

Scythe's Musashi dual-fan graphics cooler brings two 110mm fans to the table and is compatible with a number of legacy cards from Nvidia and AMD.

Thermaltake V1 AX

If you have a shiny new Core i7 processor and are looking for a quiet, good-looking, high-performance cooler, Thermaltake may have the answer. The Thermaltake V1 AX cooler ($59.99; www.thermaltakeusa.com) is similar to the original V1 and features a silent, variable speed fan, which generates only 16dBA at its minimum speed, 1,300rpm. The V1 AX's 110mm fan also sports blue LED lighting and is positioned in between two parallel heatsinks to further minimize noise. The V1 AX's heatsinks feature nickel-plated aluminum fins, four copper heatpipes, and a copper base that's polished to a mirror finish for optimal contact.

Fashionably Fresh Firmware

DViCO TViX M-6500/7000 (v1.3.74)

The latest firmware update for the DViCO TViX M-6500/7000 multimedia jukebox resolves a number of video playback and HDMI-related issues, enhances FTP performance, and improves compatibility with some audio file formats, among many other fixes and enhancements.

www.tvix.co.kr

Western Digital WD TV (v1.01)

An update for the WD TV media player adds support for more video file formats, includes more subtitle support, improves MKV (Matroska) support for chapters and subtitles, and boosts media playback and navigation performance.

www.wdc.com

D-Link DIR-655 Xtreme N Gigabit Router (v1.21)

New firmware for the D-Link DIR-655 adds SharePort features, fixes an email notification problem, and resolves a Call of Duty 4 port-forwarding issue, among numerous other fixes.

www.dlink.com

by Marco Chiappetta

M12D

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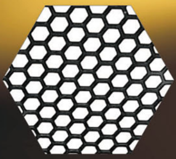
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Since 1975

Real Windows On The Eee PC

Our No-Compromise, Streamlined Windows XP Pro Installation

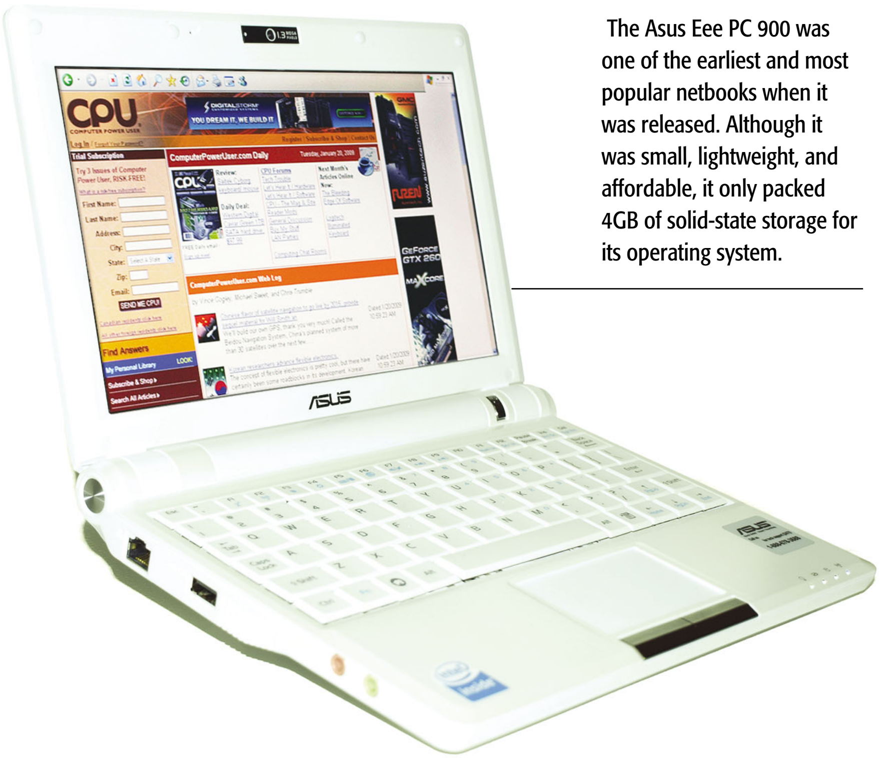
Netbooks can be quite alluring. With their ultra-small form factors and affordable prices, netbooks appeal not only to power users looking for a basic companion to a primary system but also to first-time PC owners on a strict budget.

However, the very same aspects that make netbooks so appealing can also be their biggest detriments. To keep costs down and form factors small, many netbooks, especially those offered at lower prices, are equipped with minimal storage and trimmed-down operating systems. In the case of the Asus Eee PC 900 we used for this project, a small 4GB SSD is all that's available for the OS installation drive.

This usually isn't a problem, but over time (as is the case with most systems) it's quite understandable to feel the need to start fresh and reinstall the operating system from scratch. The problem is that most netbooks don't have an optical drive. And simply restoring the factory OS image included with the systems doesn't sit well with many DIYers who like to perform clean, customized OS installations.

You may be thinking to yourself, "Just install the OS using a USB drive." For many Linux distros and Windows Vista, that is certainly an option, because their installers support it. But installing Windows XP, the most common OS for netbooks, is much more difficult.

But with a little time and perseverance, there are a few ways to get WinXP installed from a USB drive. There are some handy tools available that make it easy to pare down the OS to minimize its footprint.



The Asus Eee PC 900 was one of the earliest and most popular netbooks when it was released. Although it was small, lightweight, and affordable, it only packed 4GB of solid-state storage for its operating system.

We're going to show you one way to get the job done using an Asus Eee PC 900, a 1GB USB flash drive, and some utilities that are freely available on the Web. Access to a second PC is required, too.

The Prep Work

Before beginning, there is some prep work to be done. First and foremost, if there are important files stored on your netbook, back them up. Installing WinXP from a thumb drive to an Eee PC (and many other netbooks equipped with solid-state storage) requires wiping out the original partitions. We also suggest downloading the latest drivers for your netbook before you start, so you can install them immediately after the OS.

With your backup complete and the latest drivers in hand, it's time to wipe out the partitions on the netbook. We used the SPFDISK (Special FDISK) utility included on the UltimateBootCD (www.ultimatebootcd.com), but any partition-management utility will do. We particularly like the UBCD because it also features a very easy-to-use tool that'll create a bootable USB drive, complete with all of the apps and utilities that are included on the CD. Launch your preferred partition utility, delete the partitions on the netbook, and get ready for the fun stuff.

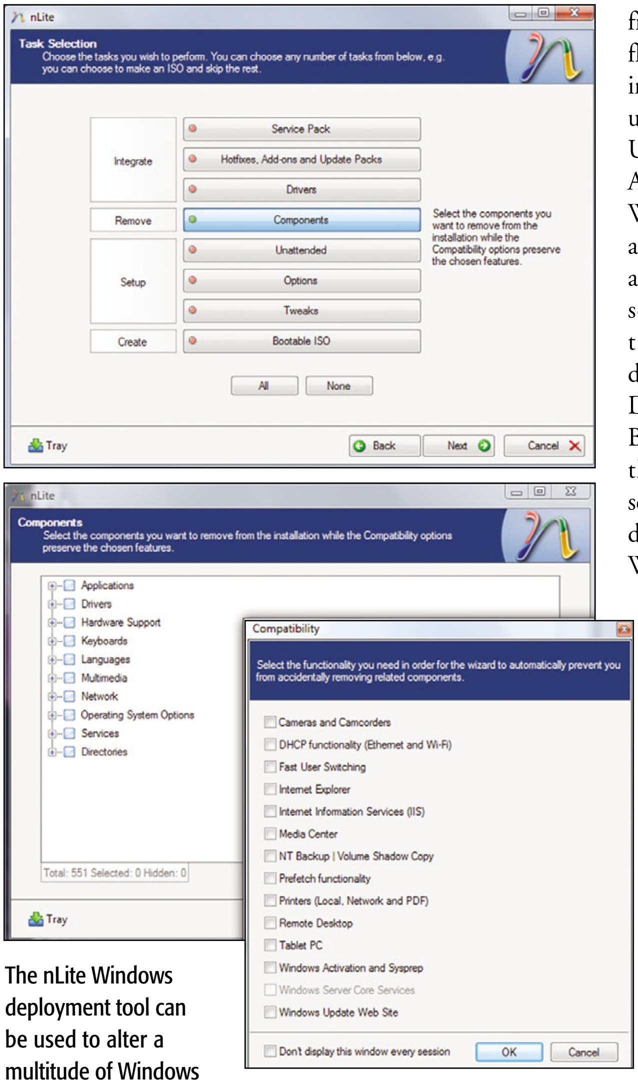
Quite nLitening

To integrate service packs and hotfixes into WinXP Pro, which minimizes the need to download individual hotfix installers (and lets you trim some of the fat from the OS), we used the deployment tool nLite (nliteos.com).

On your second PC, create a folder and copy the entire contents of your WinXP installation CD into that folder. Then, run nLite and, on the initial setup screen, click the Browse button and select the folder that contains the Windows setup files. Then, nLite will list the Windows Installer files' product name, language, version number, etc. Ensure the information is correct and click Next. If the information appears incorrect, try recopying the files from the original Windows CD and starting again.

The next menu to appear in the nLite utility will be labeled Task Selection. From this menu you can integrate service packs, hotfixes, update packs, drivers, and other components directly into the Windows Installer. We were already working with an SP3-slipstreamed WinXP Pro CD, so we didn't integrate any additional components at this step. If you don't have a slipstreamed installation CD, it can be done at this point. All you need to do is download the necessary service packs/hotfixes and point nLite to the files; the program takes care of the rest.

While on the Task Selection menu, we did choose to remove some Windows components that we didn't plan to use on our Asus Eee PC. To do so, we clicked the Components button on the Task Selection menu and then clicked Next. A window labeled Compatibility will open. In this Window, select the components you'll need installed with Windows. We selected everything except the Tablet PC, Printers, Media Center, and Cameras And Camcorders components. Click OK, and nLite will then give you finer control of the drivers and other applications that can be removed. We removed a number of games and drivers we knew we would never use, in addition to the sample backgrounds, music, images, and videos included with Windows.



Choose the tasks you wish to perform. You can choose any number of tasks from below, e.g. you can choose to make an ISO and skip the rest.

Select the components you want to remove from the installation while the Compatibility options preserve the chosen features.

Total: 551 Selected: 0 Hidden: 0

Select the functionality you need in order for the wizard to automatically prevent you from accidentally removing related components.

☐ Cameras and Camcorders
☐ DHCP functionality (Ethernet and Wi-Fi)
☐ Fast User Switching
☐ Internet Explorer
☐ Internet Information Services (IIS)
☐ Media Center
☐ NT Backup | Volume Shadow Copy
☐ Prefetch functionality
☐ Printers (Local, Network and PDF)
☐ Remote Desktop
☐ Tablet PC
☐ Windows Activation and Sysprep
☐ Windows Server Core Services
☐ Windows Update Web Site

☐ Don't display this window every session

The nLite Windows deployment tool can be used to alter a multitude of Windows setup options and create a completely custom set of installation files optimized for a specific need. In our case, we used nLite to strip out unnecessary Windows components, accessories, and drivers, trimming the size of the operating system installation.

When done selecting the items that you'd like removed from the Windows Installer, click Next and follow the onscreen prompts to complete the process.

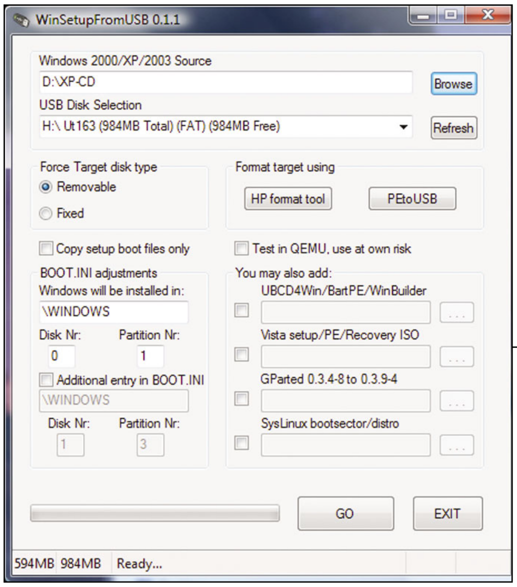
Next, WinSetupFromUSB

Once you've finished using nLite to tweak the Windows Installer files, it's time to prepare the USB flash drive. Go ahead and plug it in now. For this step, we used a utility called WinSetupFromUSB, available at www.msfn.org. After downloading and installing WinSetupFromUSB, launch the application. You'll be greeted by a single screen with a number of segments. Basically, start from the top and work your way down. In the Source And USB Disk Selection sections, click the Browse button to find and select the folder with your Windows setup files. Then, select the USB drive you plan to use for the Windows installation. In the Force Target Disk Type section, choose Removable and then click either the HP Format Tool or PEtoUSB button (in the Format Target Using section) to format the USB drive. If your USB drive is larger than 4GB, use the HP Format Tool and select the FAT32 file system. If the drive is smaller than 4GB, use PEtoUSB and select the FAT option.

With the USB drive formatted and the Windows installation files selected, click the Go button in the WinSetupFromUSB menu and let the program do its thing. Depending on the speed of your USB drive, this step can take from 30 minutes to an hour. When the file copy process is complete, it's time to get the Windows installation started.

Connect the USB drive to the netbook, power the system up, enter the BIOS, and configure the machine to boot from the USB drive. The WinSetupFromUSB program installed a boot menu on the USB drive that offers two options: First Part Of Windows XP Home Edition Setup and Second Part Of XP Home Edition Setup+Start Windows For First Time. When booting to the USB drive for the first time, select the First Part Of Windows XP . . . to launch the initial text-based portion of the Windows setup. When the Windows setup starts, proceed as you normally would through the menus, selecting and formatting your installation drive as if the OS was being installed from a CD.

When the installer finishes formatting the installation drive and copying files, the system will reboot. Boot to the USB drive again, but this time choose the Second Part Of XP Home Edition Setup . . . option, and the GUI portion of the Windows setup should begin. Once again, follow the installation steps as you would normally, inputting your product key, network settings, etc. When done with this step, the installer will restart the system once more. Again, boot to the USB drive and select the Second Part Of XP Home Edition Setup . . . option from the boot menu. The third part of the Windows installation, driver and component installation, will start. When this is done, the system will restart one last time. At this point, remove the USB drive with the Windows installation files and boot into Windows from the netbook's internal drive.



Windows 2000/XP/2003 Source: D:\XP-CD
USB Disk Selection: H:\ Ut163 (984MB Total) (FAT) (984MB Free)
● Removable
○ Fixed
☐ Copy setup boot files only
☐ Test in QEMU, use at own risk
Windows will be installed in: \WINDOWS
Disk Nr: 0 Partition Nr: 1
☐ Additional entry in BOOT.INI
\WINDOWS
Disk Nr: 1 Partition Nr: 3
594MB 984MB Ready...

WinSetupFromUSB does exactly what its name suggests. With an easy-to-use GUI, this application automates the process of prepping a bootable USB flash drive and copying the necessary Windows setup files over to the drive for installation.

The Home Stretch

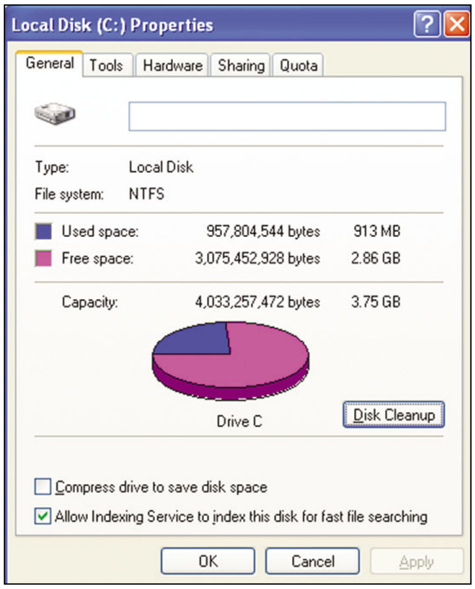
After the WinXP installation is complete, you'll notice that WinSetupFromUSB has forced a second option to be installed in the Boot.ini file. When the netbook boots, you'll be presented with the option to boot into Windows normally or to perform a USB Repair boot. You can leave the boot.ini file unaltered if you think you'd like the option to perform a USB Repair installation at some point. If, however, you'd like to remove the second option, use Notepad to open the Boot.ini file (located on the root of the C: drive) and remove the following:

multi(0)disk(0)rdisk(1)partition(1)WINDOWS="USB Repair NOT to Start Microsoft Windows XP Home Edition" /noexecute=optin /fastdetect

Save the file, restart, and Windows should boot normally.

With that out of the way, it's time for some finishing touches. Install all of your drivers first. Then move or delete some other items to free up as much space on the OS drive as possible (if your netbook doesn't have dual drives like the Eee PC 900, skip this step).

Navigate to the Program Files directory and delete the Online Services folder—it's useless. Then, click the Start button, right-click My Documents, and select Properties. In the Properties dialog box, select the Target tab and, in the Target field, type a new location for the My Documents folder. (In our case, we chose D:.) Then, right-click the Recycle Bin and reduce the amount of space reserved for deleted files. Under System Properties, reduce the amount of drive space reserved for System Restore. Finally, move the Windows swap file to the secondary drive. To move the page file, right-click My Computer, select Properties, and click the Advanced tab. Click the Settings button in the Performance section, click another Advanced tab, and then click the Change button in the Virtual Memory section. In the dialog box that opens, remove the page file from the C: drive and add one to the D: drive; reboot as necessary. When Windows reloads, perform a disk cleanup on the C: drive and delete any unnecessary files from the system. Reboot once more and you're done.



Type: Local Disk
File system: NTFS
Used space: 957,804,544 bytes 913 MB
Free space: 3,075,452,928 bytes 2.86 GB
Capacity: 4,033,257,472 bytes 3.75 GB
☐ Compress drive to save disk space
☑ Allow Indexing Service to index this disk for fast file searching

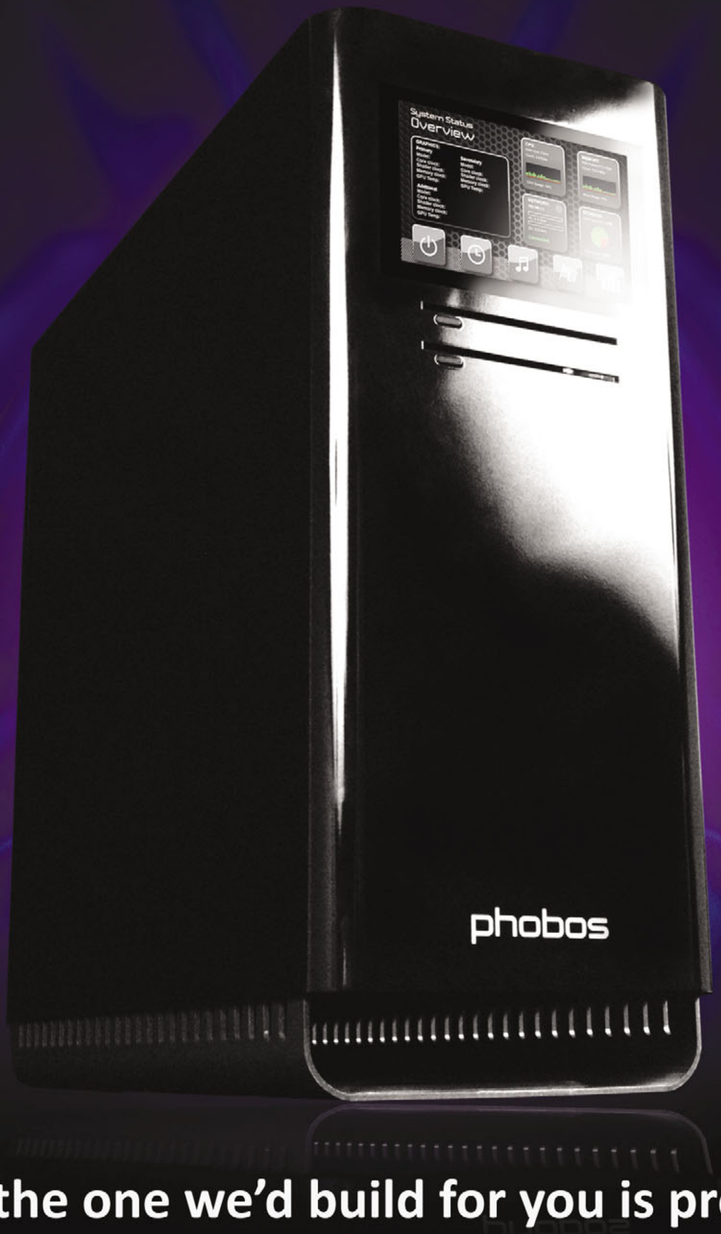
When all was said and done, the complete WinXP Professional SP3 installation, along with all of the drivers necessary to fully configure our Eee PC, consumed just over 900MB of space, leaving over three-quarters of the drive empty.

The Not-So-Big Finish

By following the steps outlined here, we were able to use a USB flash drive to install a streamlined version of WinXP Pro SP3 with all of the drivers necessary for our Asus Eee PC 900. And when the installation was complete, our WinXP Pro footprint on the boot drive was slightly over 900MB, leaving almost 3GB free. It took some time and effort, but we finished with a clean OS install tweaked to our liking. That's time well spent. ▲

by Marco Chiappetta

You know how to build your own PC.



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You've built your fair share of gaming PCs for yourself and your friends throughout the years. Isn't it time you treat yourself for all of your hard work?

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Mad Reader MOD

Battlestar Galactica Takes Flight

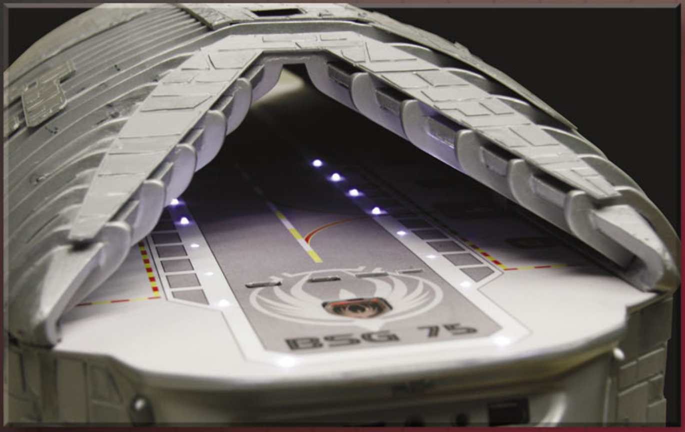
Case modders are obsessive by nature. Every wire, LED, flame, pinstripe, window, LCD, hose, etc. must have a specific place and purpose while cumulatively adding to an overall appearance that instantly grabs and holds one's attention. Knowing this, it's not surprising that Brian "Boddaker" Carter's insanely intricate Battlestar Galactica mod took 15 months to complete. What you wouldn't know without asking, however, is that several "complications" having nothing to do with modding sidetracked Carter while constructing BSG, winner of *CPU*'s PDXLAN 13 Case Modding Contest on Jan. 17 (see page 46 for coverage).

Already the father of a young son when he began conceptualizing BSG, Carter welcomed a baby daughter into the world roughly halfway through the BSG build process. To his credit, Carter didn't let a hunk of Cooler Master Stacker 830-branded aluminum stand in the way of paternal duties. Instead, he walked away from BSG for several weeks to be a daddy. When he did get back to work, he waited until 10 p.m. or so to send his kids off to dreamland before heading to the garage to work into the early morning. "I didn't want to sacrifice any daddy time," Carter says. "I was adamant about taking time off to spend with my kids."

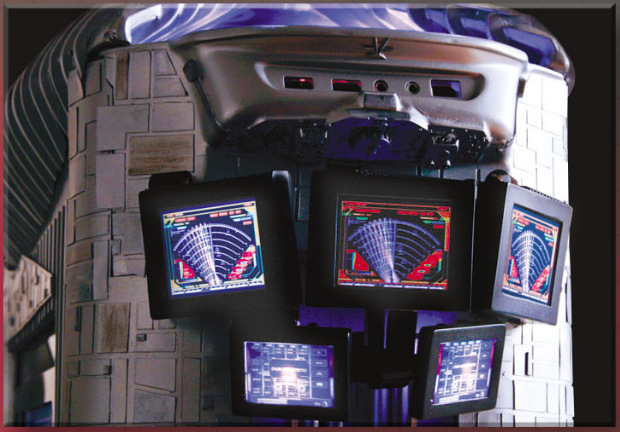
Previously featured on bit-tech.net and SciFi.com's home page, BSG finished third at Nvision 2008's Ultimate Case Mod Challenge. Witness BSG's breathtaking realism by way of its side engine pods, armored paneling, and intricate Viper landing bay with functioning running lights and you know why. Carter, a Chico, Calif., video producer, conservatively estimates pouring 600 to 700 hours into BSG. Ideas, tips, inspiration, and advice came from watching (and constantly pausing) "Battlestar Galactica" episodes, model-based Web sites, and production log feedback. Better, Les Stringer, a "Battlestar Galactica" CG supervisor, provided Carter with original renderings to reference. "That really gave me good insight to the inside landing strip," Carter says.

BSG is Carter's first mod to incorporate watercooling and LCDs. "That was the challenge, and I love a challenge," he says. Another challenge was completing BSG in time for Nvision, something he didn't do until about an hour before packing his car to leave for the show. Upon arriving, he was still faced with the last-minute, tension-induced task of getting BSG's bank of tiny LCDs operational. "I was literally hacking on the case an hour before I had to drive down," Carter says.

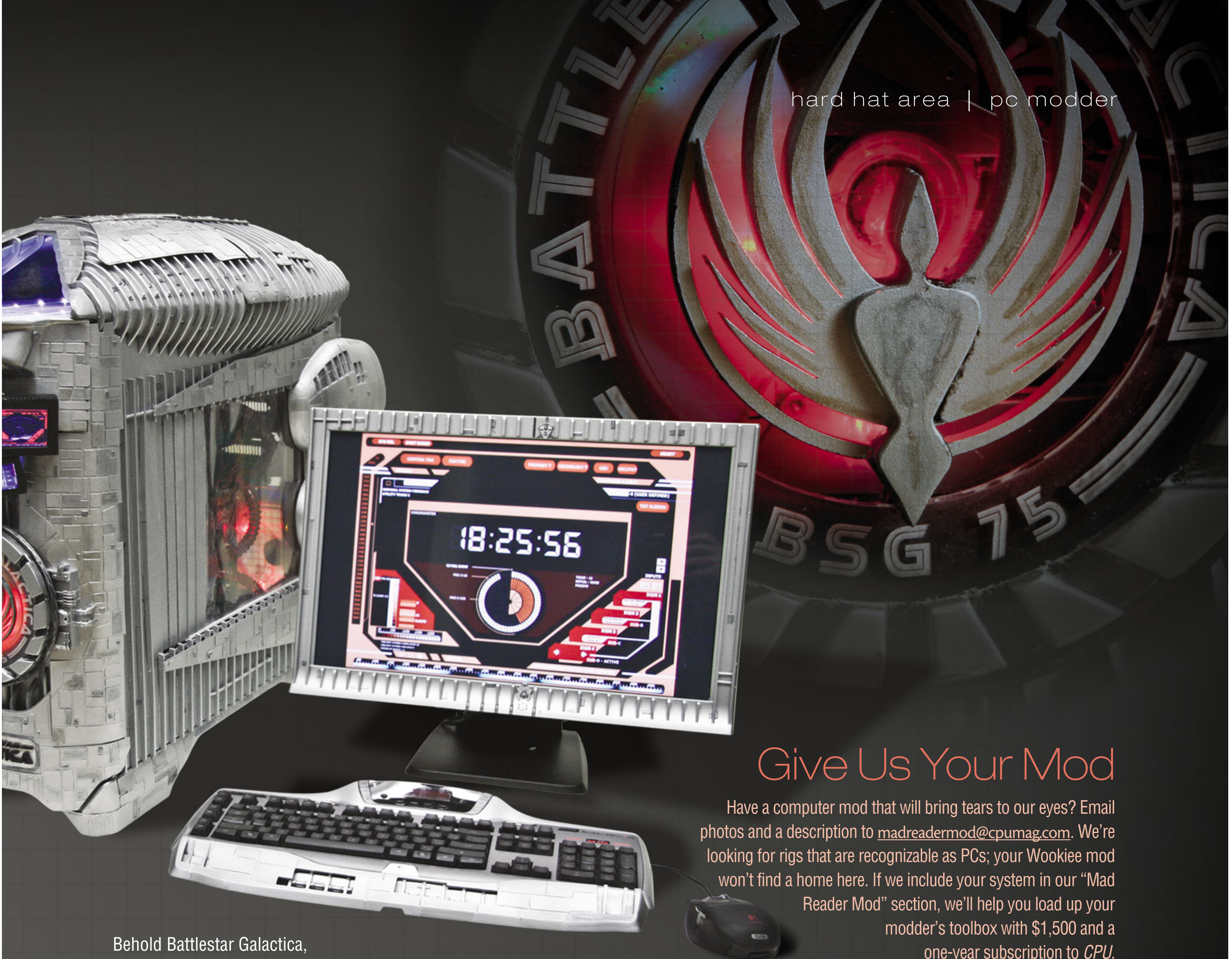
These days, Carter is modding a Lian Li case he hopes to have finished by the time you read this that will "go the opposite way" of BSG, employing triple-loop watercooling, hidden wires, and a "really clean and straightforward" appearance. As for BSG, Carter is open to selling the system after "Battlestar Galactica's" series-ending episodes conclude this season. "I get a ton of email that says, 'Dude, can you make me one of those?'" he says. Something tells us interested parties should be prepared to bid high and often. ▲



Battlestar Galactica oozes with Carter's intricate, complex handiwork, including the armored paneling and handmade top-located landing bay, which has functioning lights that blink sequentially.



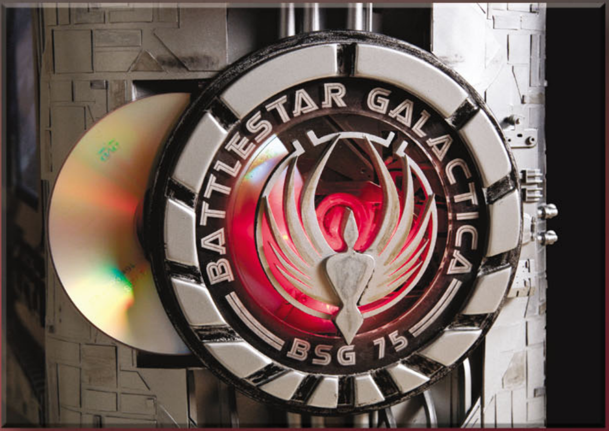
Yes, these 2.4-inch LCDs actually function, displaying DRADIS (direction, range, and distance) data, as well as system temps, fan speeds, CPU usage, and more.



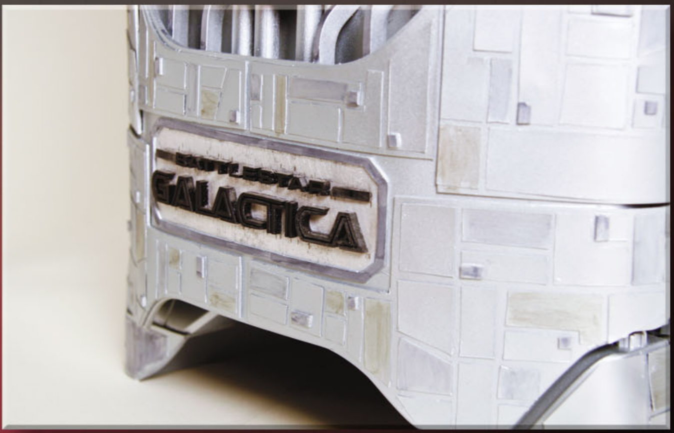
Behold Battlestar Galactica,
Brian Carter's stunning achievement inspired by the
Sci Fi Channel's equally stunning "Battlestar Galactica" series.

Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. We're looking for rigs that are recognizable as PCs; your Wookiee mod won't find a home here. If we include your system in our "Mad Reader Mod" section, we'll help you load up your modder's toolbox with $1,500 and a one-year subscription to *CPU*.



Carter mounted BSG's DVD drive vertically behind this clear-acrylic logo. For good measure, he cut out a window in the drive cover.



This laser-cut lettering appears below BSG's front-panel medallion logo.

A Baker's Dozen

PDXLAN 13 Doesn't Disappoint

Other than a pesky Internet connection named "Dory" (think "Finding Nemo") swimming about the confines of the Portland Airport Holiday Inn Convention Center, you'd have never guessed the unflappable Matt "Vector" Conwell was hosting the 13th edition of his PDXLAN event Jan. 16 to 19. You know what they say about the number 13, after all. Still, despite the dreary economy looming outside, fewer vendors in attendance than previous years (blame CES' proximity the week prior), or 70mph-plus winds wreaking havoc on trees and power lines outside, Conwell and his 500 gaming guests appeared to be the luckiest people on this planet, or any virtual one they happened to be fragging on.

Former Mad Reader Mod winner Rod Rosenberg poses next to an oversized print of May 2008's *CPU* featuring Rosenberg's winning Trash80 mod.

Conwell has staged PDXLAN roughly twice a year since 2003 in Portland, Ore. Occassionally, Conwell mixes in a .5 version that doesn't include on-hand vendors. PDXLAN 14.5, for example, is scheduled for November 2009. Where gamer interaction at other notable LAN parties often stems from tournament play and discussions connected to the subsequent prize money at stake, PDXLAN events feel more like a gathering of like-minded friends using gaming as an excuse to get together and catch up. Beyond friendly (yet spirited) marathon sessions of Call of Duty fueled by countless cans of Bawls energy drink, PDXLAN is as much about making the rounds as it is shooting rounds of ammunition.

"This is such a great event," says PDXLAN vet Rod Rosenberg, a past *CPU* Mad Reader Mod winner for his Trash80 build (May 2008, page 44). "Matt does it right. He's really good at thinking all the way around an idea," Rosenberg says. Case in point, Rosenberg says Conwell has encouraged him to follow through on an idea to quench the thirst of attendees' of PDXLAN 14 in July with Bawls G33K B33R floats.

Meanwhile at PDXLAN 13, Intel gifted each attendee with a copy of Call of Duty World at War, while Antec and Patriot were on hand displaying their respective wares in booths. Danger Den's considerable contingent showed off a bevy of wood- and glass-dominated cases and mind-blowing custom paint jobs from Smooth Creations. Throw in helping hands from Trendnet, Bawls, iZ3D, GarageGames, and dedicated volunteers, and all the makings for a hell of a weekend-long party were in place.

Bring On The Mods

Beyond renewing friendships over gaming, PDXLAN has also been the home in recent years to a *CPU*-sponsored case modding contest. Unlike in past years in which contestants had to enter to win, PDXLAN 13's competition was open to anyone with a modded case. With nearly all 500 attendees possessing a case sporting at least a few personal mod touches, pretty much everyone was eligible to win. At stake? A check for $1,500, a year's subscription to *CPU*, and a spot front and center on *CPU*'s April cover. Top honors went to Brian "Boddaker" Carter for his Battlestar Galactica mod, a spot-on replica of the battleship Galactica from SciFi's TV show of the same name. Check out Carter's stunning attention to detail on page 44.

Marking another contest first at PDXLAN 13 was the addition of respected modder Richard "DarthBeavis" Surroz to *CPU*'s panel of judges. Surroz, whose Autopsy mod was selected as *CPU*'s November 2007 (page 46) Mad Reader Mod pick, recently displayed his "Blade"-inspired DayWalker build at Nvision 2008 and his The Globe mod at CES 2009. Surroz optimistically doesn't foresee the current economy handcuffing

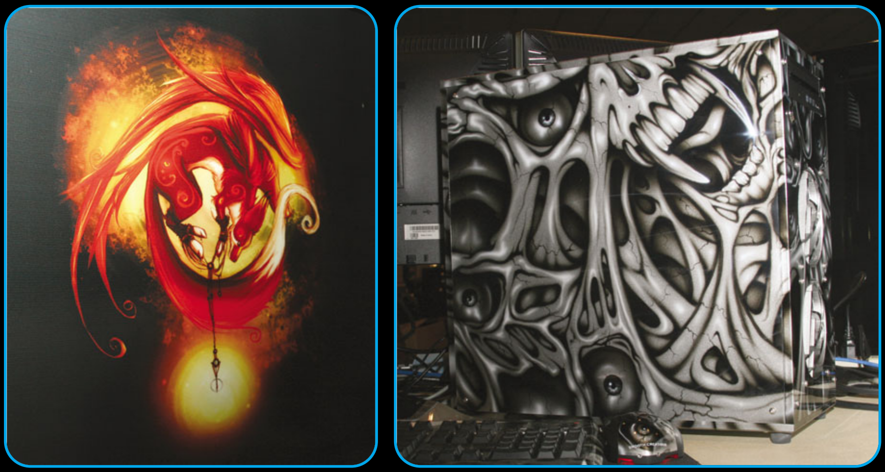
Personal modding touches were on display everywhere at PDXLAN, including this Buddha statue that presumably brought its owner good luck in Call of Duty.

modders in their future builds. Instead, "We'll see more mods with less," and modders getting " . . . more creative with less," he says. Already, Surroz, an eight-time PDXLAN vet, says modders "are stepping up to the plate. People are being a little more courageous."

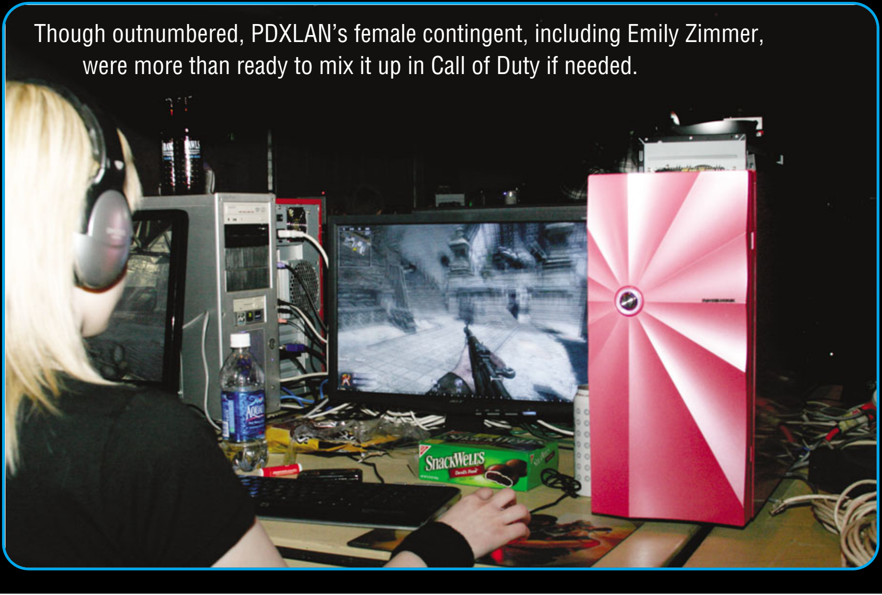
This definitely seemed the case as we eyeballed and inspected literally every PC at PDXLAN. After painstakingly whittling 500 potential winners to a list of 10, we followed up with a healthy dose of discussion and debate to narrow our selections to a top five, three of which impressively came from first-time modders. Among the first-timers was Bob Stewart, a Union, Wash., sales territory manager who unveiled his ultra-popular Ant Farm at PDXLAN 13 complete with 275 living ants ingeniously encased in a side panel filled with actual ant farm gel and backlit in soft blue. Better, Stewart's internal wiring was some the finest you're likely to encounter, first-time builder or not. Stewart, who considers himself a jack-of-all-trades, says, "I like things that are neat and clean. It has to be that way." Concerning his next mod, Stewart says, "I've got the fever now. I'm ready to go."

Fellow first-time modder and finalist Robbie "OSUsimps" Simpson is an Oregon State University student studying chemical engineering. Simpson took just two months to build his Portal mod, a towering, two-piece system assembled primarily in Simpson's apartment and dad's garage. Inspired by his love of Valve's single-player action/puzzle title of the same name, Simpson says, "It's funny how you can sacrifice sleep for something you have a passion for." Less than $100 went into Portal's defining freestanding cube, which contains 60-plus separate pieces and took Simpson longer to build than the rest of Portal combined.

Like Simpson, first-time modder and finalist Cindy "Josephine" Bolton did all the paint work on her Scuba mod herself. After using a Dremel to create an



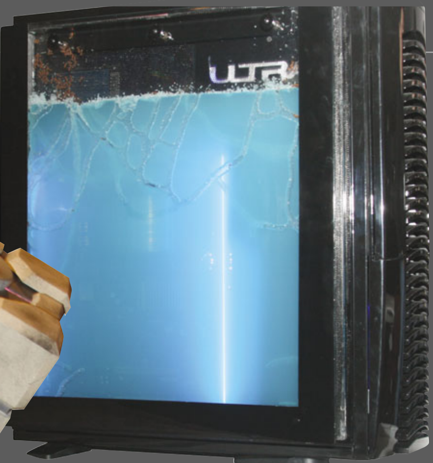
Planning to attend a future PDXLAN? Be prepared to encounter side-panel artwork likely to take your breath away.

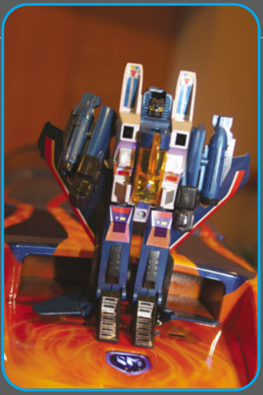

Though outnumbered, PDXLAN's female contingent, including Emily Zimmer, were more than ready to mix it up in Call of Duty if needed.

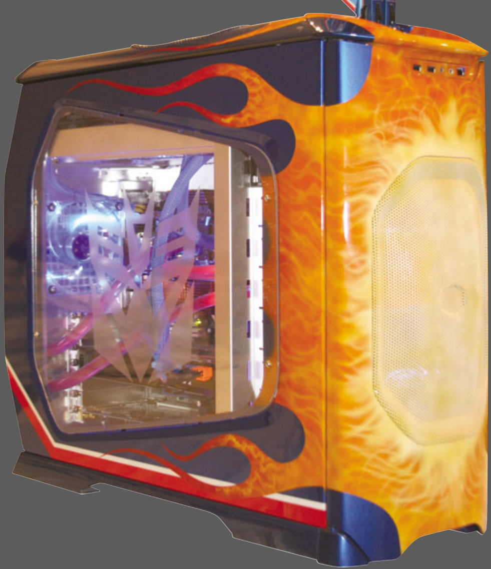
opening for a purposely blurred case window that invokes a sense of being underwater, Bolton freehanded the coral reef-inspired paint job that adorns Scuba's side. Remarkably, Bolton, a Portland native, nailed the work on the first take. "I think people tend to overdo it," Bolton says. "I was aiming to make it as simple as possible." Bolton, an avid scuba diver, is now at work conceptualizing a Queen Elizabeth-inspired mod that will probably be "something more feminine" and will likely sport crown jewel-like accessories.

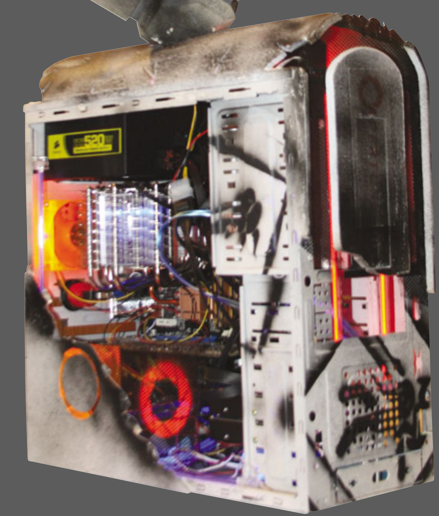
The jewel that caught Joe "Johnny Courageous" Matthews' eye as a kid standing in a Staten Island toy store in 1984 was a Transformer action figure.

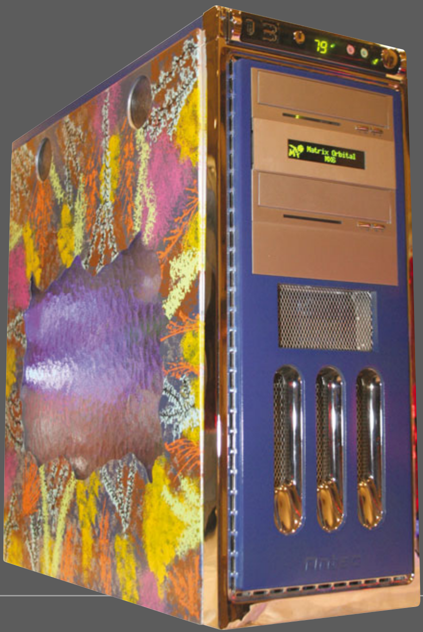
Finalists


Besides being a finalist in our Case Mod Contest, Bob Stewart's Ant Farm contained some of the finest internal wiring and cable management we've come across.


Joe Matthews' childhood love of "Transformers" inspired his fire-breathing Thundercracker Crash & Burn case.




Robbie Simpson's ode to Portal remarkably took the Oregon State University student just two months to build.


Besides installing a case window, first-time builder Cindy Bolton freehanded the underwater-themed paint work on her Scuba mod.

Matthews' subsequent affection for all things Decepticon and Autobot led him to forge Thundercracker Crash & Burn, an orange-, blue-, and yellow-flamed menacing beauty. Matthews, an employee in Port Angeles, Wash.'s, IT department, got a big assist from friend and automotive paint specialist Matt Bronsink, who originally intended to use Matthews' case simply for practice. Bronsink's finished work, including sinister flames shooting across the system's topside grilles, however, was so good that Matthews decided to keep them. Good choice.

14 & Counting

Undoubtedly, Conwell could draw well beyond 500 gamers to each PDXLAN. He caps attendance to this number, however, to help keep the event's motto of "Have fun. Frag hard" ever present. Already, 400 people have registered for PDXLAN 14 in July, but if you act quickly, your $65 registration fee might just secure you raffle tickets for thousands of dollars' worth of prizes, free swag, 3.4 amps of power, and your own 3-foot x 30-inch section of table space from which you can game while catching up with old acquaintances and making new ones. ▲

by Blaine Flamig

Intel LAN Fest Sacramento

While Team *CPU* journeyed to the Pacific Northwest to attend yet another successful PDXLAN, we also set our sights slightly south of Portland and sent a detachment to sunny California to attend Intel LAN Fest Sacramento. Held at Intel's Folsom campus, LAN Fest Sacramento was host to almost 200 attendees hungry for a weekend of hardcore gaming, and the fourth-annual LAN party didn't disappoint.

LAN Fest Sacramento has its roots in Washington, home of InfernaLAN, the LAN party that started the series of Intel LAN Fests. A group of Intel employees with a shared love for gaming organized the first InfernaLAN. InfernaLAN eventually blossomed into what LAN Fest is today.

Nathan Johnson, who runs a small local LAN of his own in Grass Valley, Calif., quickly points out that although Intel provides a venue and prizes, the chipmaker doesn't officially sponsor the LAN parties. However, Intel matches each attendee's entry fee dollar-for-dollar, and the sum is donated to charity. Intel workers volunteer as support staff (while sneaking in a little gaming action themselves when possible).

"[Intel's support] is awesome for gamers, because it gives us a venue to host our LAN parties," Johnson says. "We tried for two years to get a big LAN together. The cheapest places were $10,000."

LAN Fest Sacramento kicked off Friday, Jan. 16 and wrapped up on Sunday, Jan. 18. Tournaments for Team Fortress 2, Call of Duty 4, Battlefield 2, and Counter-Strike: Source continued virtually nonstop, while Super Smash Bros. Brawl, Rock Band 2, and Mario Kart Wii tournaments raged on consoles. And, of course, plenty of pizza and pop was on hand for attendees to refuel. (Marathon gaming is exhausting, folks.)

Fun For All

Attracting veteran LAN goers and rookies alike, Intel LAN Fest seemed a success, based on testimony from both. "It's pretty enjoyable, a pretty friendly environment, says Alex Kukharets, a first-time Intel LAN Fest attendee. Kukharets, who hadn't attended a large LAN until LAN Fest Sacramento, says his favorite part of the LAN is being able to play any multiplayer game.

"You can meet new people and new friends that have similar interests as you, as opposed to local events where you know most or all of the people," he adds.

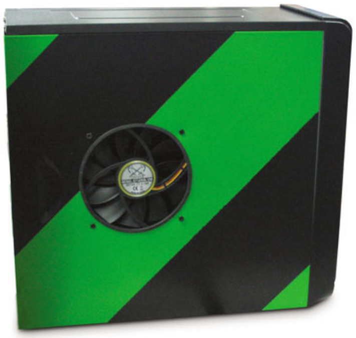
Another attendee, Kirk Stenroos, is no stranger to large LANs. He's attended "tons" of large LANs, including PDXLAN and Nvidia's GeForce LANs. He says that medium-sized LANs such as LAN Fest Sacramento have a distinct advantage over giant LANs.

"Here, it can be a little different," he says. "[At big LANs], all you see is names, and you don't necessarily know the player behind the name. Smaller events are better than big and bloated LANs."

Johnson, on the other hand, likes how LAN Fest compares to smaller events. "There are more people, but there's more energy and excitement. You can do bigger things like a 32v32 Battlefield match.

"There's competition you don't find at small LANs. Teams fly in to challenge each other for bragging rights."

If You Mod It, We Will Come



This year marks the first year *CPU* has partnered with LAN Fest to bring a mod contest to the events. The finalists from each LAN Fest event will square off at the conclusion of the LAN Fest 2009 circuit to determine the top mod of LAN Fest. Jonathan Ahrens' Caution mod emerged as the victor from LAN Fest Sacramento.

Ahrens used automotive paint to give Caution its custom, striped, hazard-tape look. The paint job required hours of meticulous sanding and painting before Caution had its stripes. He also used a Dremel to cut an enormous side-panel fan, giving Caution better cooling and further distinguishing it from the myriad of humdrum midtower cases.

Caution's CPU is overclocked from 2.6GHz to 3.2GHz and uses an aftermarket Zalman fan to keep things cool.

LAN Fest Rolls On

With the first LAN party of LAN Fest 2009 in the books, look for LAN Fest to make stops in Portland, Ore. (Feb. 28 to March 1), DuPont, Wash. (March 27 to March 29), and Phoenix, Ariz. (June 13 to June 14). See you there! ▲

advanced Q&A corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

Each month we dig deep into the mailbag here at CPU *in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*'s "Advanced Q&A Corner" is here for you.*

Susan G. asked: I was given a D-Link wireless camera recently and have some questions about how to access it over the Web. I know the camera is set up properly because I can access it from home using the shortcut that's on my Desktop. But when I try to access it over the Web from a friend's house or while at the office, I just get a Page Cannot Be Displayed error. A techie friend of mine said I have to use my IP address with a ":81" on the end, but when I do that it still does not work. If I type **192.168.0.7:81** into my Web browser, I get the same Page Cannot Be Displayed error message whether I use IE or Firefox. I have a wireless router and broadband cable Internet connection at home where the camera is connected, if that helps. Any clue what's going on here?

> "We tend to lean more toward the middle-of-the-road speed bins with the lower latency settings vs. the really high-end kits."

A number of manufacturers, such as D-Link, produce Wi-Fi-enabled cameras that users can access remotely via the Web.

A: Although accessing a camera feed over the Internet may sound easy enough, there are a number of factors you must take into consideration. What your friend told you to do was correct on some levels, but he (or she) left out some vital details. After perusing D-Link's support site, we see that its Wi-Fi-enabled cameras use port 81 by default; hence the :81 that's supposed to be added to the end of your IP address. However, the 192.168.0.7 IP address you used was incorrect.

That's the internal IP address assigned by your router to the camera. What you need to use is the external IP address assigned to you by your ISP. To find your external IP address, you could log into your router and find it listed under the WAN IP Address or simply go to www.whatismyip.com—it'll be listed at the top. Let's say your external IP address is 72.54.33.12; add :81 to the end, and you'll have the correct address to access the Web cam over the Web.

As they say in many an infomercial, "But wait, there's more!" Knowing your external IP and the correct port to hit the Wi-Fi camera only gets you halfway there. You also need to set your router to forward traffic on port 81 to the camera. Just about every router on the market today gives users the ability to forward inbound traffic to a particular system or device on the network. What you have to do is log in to your router, typically by typing **192.168.0.1** or **192.168.1.1** into your Web browser. (If you haven't changed them, the default login credentials should be in the manual or on the manufacturer's support page.) Then, navigate through its menus until you find port forwarding options; they'll usually be listed in the advanced or tools menus. When you find that menu, you'll need to forward inbound traffic on port 81 to your camera, which uses the 192.168.0.7 IP address.

Once you've forwarded the inbound traffic to the camera, there are two more things to consider. One, your external IP address is likely to change at some point, because most ISPs don't offer a static IP to home users without having to pay an additional fee. Any time you go out and plan to access the camera remotely, you'll have to check your external IP. Or better yet, you could sign up for a dynamic DNS service that will track it for you. And finally, note that your router may assign a new IP address to the camera if the power to the camera or the router is ever cycled. To ensure your router always assigns the same IP address to the camera, you'll also have to add a DHCP reservation request to your router's configuration menu that will force the router to assign the same IP every time. We explained how to do that in a previous issue *(CPU* February 2009, pages 46 to 48*)*. With all of that done, you should finally be able to access the camera remotely. Good luck.

Chuck W. asked: I've been messing around with digital video and creating photo slideshows with audio for my family. I've pretty much got the hang of it and have been able to produce some cool stuff, but I was wondering if you could help me with something. The program I use to create the slideshows takes all of my files and outputs them as a single executable. When I give a disc to a friend to watch the slideshow, all they have to do is open the disc in Explorer, double-click the .exe, and the slideshow starts. I just want to know if there is an easy way to make the slideshow start automatically when the disc is put in the drive so no one would have to open the disc manually and double-click the file.

A: Yes, Chuck, there is a very easy way to have the file launch automatically when the disc is inserted in the drive. All you have to do is create a simple text file named Autorun.inf, add a few parameters, and burn it to the root directory of the disc along with the slideshow.

First, create a simple text document using Notepad and save it as Autorun.inf. Make sure when you save the file, you choose the Save As option, and choose All Files (*.*) from the Save As Type menu; otherwise, the file will be saved as Autorun.inf.txt and it will not work. Once you have created the Autorun.inf file, add these lines to the body of the file:

```
[autorun]
OPEN=your-file.exe
```

Remember to substitute "your-file.exe" with the name of your slideshow file. Save the Autorun.inf file, and when you burn the slideshow to a disc, make sure to put the Autorun file in the root directory and you should be all set.

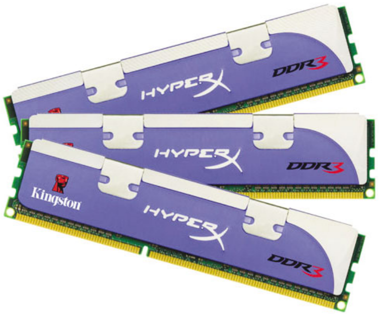
Rich S. asked: I recently upgraded my graphics subsystem to a pair of GeForce GTX 280 cards. I'm a serious gamer and though I don't like the power draw these things put on my system, or the wall outlet for that matter, I do love being able to play all of my favorite games and some new titles, all at native res on my 30-inch flat panel. Since I added these two pixel-crushing beasts, I haven't had a moment of system instability, surprisingly, probably because my power supply is a 1kW model already and is up to the task at hand. However, I have experienced some pretty odd behavior from my HP LP3065 LCD. Recently, out of the blue the screen will go blank and drop into power standby mode for no reason at all. Though I haven't seen this while gaming, sometimes I'll be working on the desktop and all of a sudden the screen goes blank and the power light on the panel turns from green to amber. Typically if I hit the power switch off and back on again, it will sync back up and work, but then a few minutes later it happens again. I can sometimes go for days without seeing this and then it comes back again and it's driving me nuts! I've tried pulling one of the GTX 280 cards, thinking it might be heat-related with the GPUs, and have even tried swapping in and out each one but the same thing happens after a while. I have no idea what's causing this but the whole issue coincides with my graphics upgrades. Help!

A: Rich, that sounds like a pretty stressful situation you've got going on there. Deep breaths, brother, deep breaths. All right then, you didn't tell us who the manufacturer of your GeForce GTX 280s were, so we'll assume for the sake of conversation that they're fairly new builds from a major brand-name manufacturer. However, early upon its initial release (which admittedly was a long time ago), there were reports of boards that needed reworking for one reason or another. We think it's safe to assume that this is likely not your problem, however, especially since what you're describing sounds more like an issue with the panel synching up to the card rather than a signal issue. You've also ruled out a bad DVI port on your graphics by trying different cards for output, as well. In general, we'd start looking at what's going on with that 30-inch window to your virtual world.

A monitor that is losing sync could be indicative of any number of issues. The standard issue we see on a regular basis is a worn out dual-link DVI cable. If you have access to another cable, or can borrow one from a friend, you might try swapping that out first. Also, make sure the connectors are screwed in tight, both at the computer end and, of course, at the back of the panel, where there is generally a lot more flex and movement of the cable from time to time. It's not a common issue but cables do go bad, especially if you tend to be hard on them.

Another issue you might look at is drivers. When you set up those new GeForce GTX 280 cards, did they come with a new system build or OS install? Though Nvidia does a pretty good job of setting up display panel configurations, especially for something as standard as an LCD's 60Hz refresh rate, sometimes it's best to hit the LCD panel manufacturer's site for the latest driver/.inf files that support the OS you're running. Sometimes Windows Update just doesn't have the latest information in its database for drivers like this. Finally, if you're still seeing this issue, check the LCD scaling options menu in your Nvidia driver's control panel. You can try setting the scaling options to either the graphics card's scaling engine or the monitor's. We'd tend to recommend going with the default settings for the drivers you are running (get the latest Nvidia drivers of course), but try different settings to see if that helps. At the end of the day, you may well realize that your 30-inch beauty is on her way out for one reason or another, but try these troubleshooting steps via process of elimination and see if there's some other ghost in your machine.

Freddy Z. asked: I recently started building a new Intel Core i7 gaming rig and have been poring through specs of different types of memory modules in an effort to get the best DDR3 memory I can find at the new lower voltage levels required, as well as in the various matched triple-channel kits that are out there. There are also rated speeds and latency settings to consider and that's what always confuses me a bit. What's better, higher rated speeds with slightly higher latency or lower latency modules that don't quite hit the very high-end speed bins?

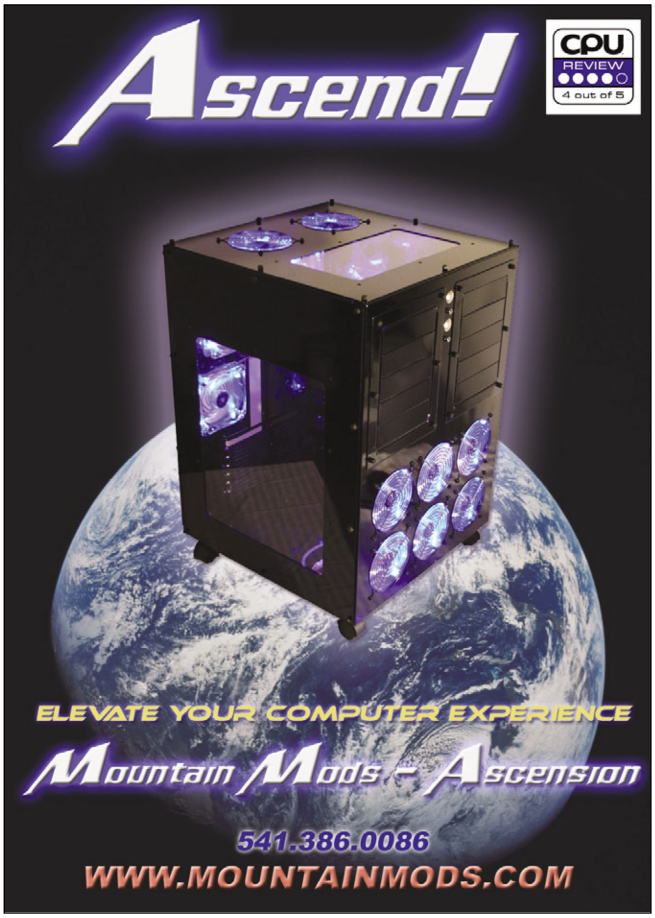


A lot of memory manufacturers are coming out with triple-channel memory kits for Core i7 systems and motherboards. As usual, higher clock speeds are always a tradeoff for higher latency.

A: There's nothing like a new platform introduction to get you re-immersed in all the new technology, eh Fred? All the memory module manufacturers are back at it, optimizing their offerings for the new Core i7 and the associated X58 Express chipset-based motherboard designs that are coming to market now. At this year's Consumer Electronics Show in Vegas, we even saw kits from a couple of manufacturers that, at a modest 1.65V operating voltage, could actually hit a snappy 2GHz! However, latency vs. clock speed is always a tradeoff you'll have to make with all types of system memory.

We tend to lean more toward the middle-of-the-road speed bins with the lower latency settings vs. the really high-end kits. For example, if you have a kit that is rated for 2000MHz clock speed but will only do so at a CAS latency of 10, that higher latency setting is going to negate some of that extra clock speed performance vs. say an 1800MHz kit at CAS7. On the other hand, if you're intent on extreme overclocking, having that extra headroom in overall clock speed might buy you some added flexibility, since that 2GHz kit will likely run at 1800MHz and a lower latency setting, as well. We just feel you reach a point of diminishing returns from a price standpoint with the really high-end kits. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com



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P4P Winning Over ISPs

New Protocol To Make P2P More Practical

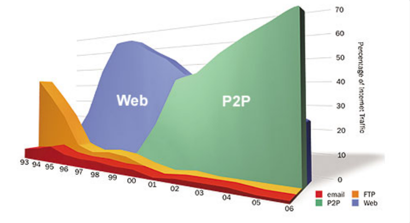
You'll have to forgive those involved in developing the P4P technology and protocols if they've felt a bit like politicians during the past couple of years. With the antagonistic attitudes between P2P (peer-to-peer) file-sharing companies and ISPs, those promoting P4P may have felt a lot like peace-making politicians.

If early tests are any indication, though, the acceptance of P4P appears to be a case where the technology is beneficial enough for everyone that the opposing factions can't help but come together.

The P4P technology, officially called Provider Portal for Applications but almost always shortened to P4P, aims to streamline the process by which ISPs work with P2P file-sharing networks.

The Problem

As P2P file sharing has increased in the past decade, overall Internet traffic has increased tremendously, as well, which costs ISPs more money. Consequently, ISPs have sometimes resisted P2P traffic, blocking or limiting it. Promoting the idea of P4P has had to overcome what Robert Levitan, CEO of Pando Networks, a P2P company, calls an "adversarial relationship" between P2P providers and ISPs.



This graph estimates that P2P traffic accounted for 70% of ISP traffic in 2006, steadily growing in the previous several years.

Sources: P4P Working Group, CacheLogic

"Network carriers were deploying many tactics to block P2P traffic," Levitan says.

Obviously, such issues cause problems for end users. However, they cause bigger problems for P2P network providers and for ISPs. ISPs have been deploying P2P caching devices and terminating connectivity to limit P2P traffic. P2P software tries to fight back by encrypting the traffic and using random ports. As the P4P Working Group has said, that is a "lose-lose" situation.

P4P aims to provide a framework to allow ISPs and P2P to cooperate, creating a "win-win" situation.

The Solution

Haiyong Xie, who was working on his PhD dissertation at Yale University when he came up with the idea for P4P, says he developed the idea after conversations with his wife, who works for a tier-2 ISP.

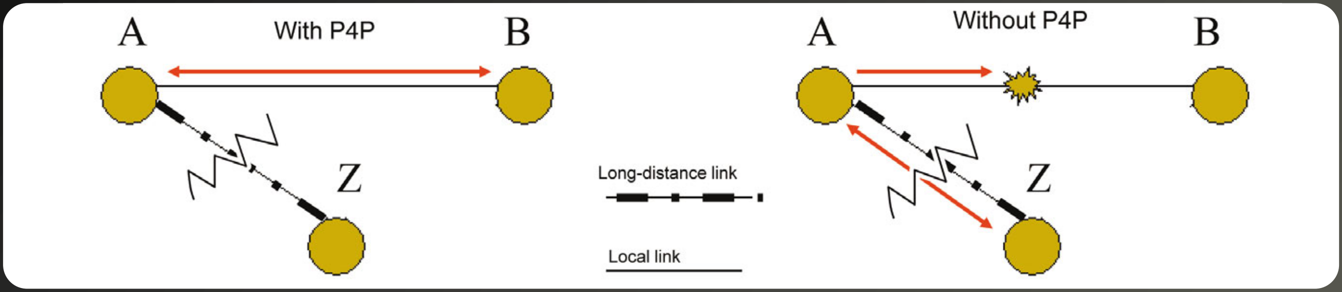
"I started to focus my research on the tension between P2P and ISPs in late 2006," Xie says. "Some very interesting discussions with my wife in 2006 sparked the idea. . . . She knew how much ISPs were concerned with P2P and the difficulties many ISPs were facing. We had a lot of very interesting discussions about these issues. We both believed that there must exist a better solution, a solution based on mutual trust and cooperation."

In July 2007, Xie presented his ideas in New York City at Brooklyn's Polytechnic University. After that presentation, Xie had discussions with Laird Popkin, CTO of Pando Networks, and Doug Pasco of

Problems For P2P With ISPs

Because ISPs do not disclose network information due to privacy concerns, it's difficult for P2P to determine the best relationships among data sources. On the left, a perfect P2P relationship would allow A and B to see each other and share data. However, such as with A and B in the image on the right, ISPs sometimes purposefully attempt to block the sharing of data or, by not revealing network information, P2P doesn't always realize that A and B would be an ideal match, forcing A to travel to Z to find the data, using a few long-distance lines. P2P can guess at some of those relationships, but, without the information from the ISPs, it's only a guess, and it doesn't work all of the time.

P4P would reveal A to B all of the time, without revealing proprietary ISP network information. P4P guides the peering relationships in P2P systems, improving traffic throughput and dropping traffic costs for ISPs. ▲



Source: Yale University, Haiyong Xie

Verizon. A couple months earlier, his first presentation about his ideas didn't go well, with many doubters. Thanks to Popkin and Pasco, the second presentation was a bigger success.

"The feedback from that audience was really positive," Xie says. "That really surprised me. I was worried about what I should do, if I had received the same feedback as earlier."

Xie did not know about Pando and had never met Popkin or Pasco before his presentation. But they quickly developed a series of successful trials that proved the viability of P4P.

"The three of us had several discussions, and we all thought to create a working group to promote adoption in the industry," Xie says. "Initially, the working group was only a few members. . . . After the first trial, the P4P working group grew rapidly."

The Protocol

Under the P4P protocol, ISPs provide some internal network information to devices called **iTrackers**, which are P2P network servers specializing in finding downloadable files.

Without P4P. When downloading a file using P2P, the tracking server might not be able to "see" the desired file on a nearby peer. Instead, the tracking server might make a request for the file across the country, incurring long-distance charges for the ISP and longer download times for the peer requesting the file.

With P4P. Thanks to the information from the ISP about its network, the tracking server now can see the file on a local peer. The ISP gives the iTracker the information it needs to find the file locally, whenever possible, thereby saving money for the ISP. Even if the iTracker cannot find the file somewhere on the ISP's own network, with P4P it has a better chance of finding the file on a peer that's in the same city on another ISP's network, again saving long-distance charges.

Some ISPs resist providing the information, fearing they might give away proprietary data about how they operate and store files. However, such information isn't necessary for P4P to work. The iTracker "provides guidance, but it doesn't provide details," Popkin says. "It says, 'These items are close, these are far away.' It provides abstract guidance about what is near and about which P2P to connect with. . . . By having an awareness of the network as to who is near, it allows the ISP to make smart choices."

According to Pando, the initial tests with Verizon showed that the average distance for data to travel shrinks from about 1,000 miles to 160 miles using P4P. With another P4P test in the fall of 2008, Pando found that the long-distance nodes required to download a file fell from 5.5 nodes to 0.7 nodes, on average.

"If you can get data from someone on the same network, or even in the same city, you're not going over long-distance lines," Popkin says. "It costs the ISPs less, and they also perform better. People get downloads much more rapidly, and at lower costs to the ISPs."

Moving Forward

A major concern regarding P4P is the idea that it could be used to expand illegal fire sharing that can occur with P2P.

"I am also worrying about P4P being taken advantage of by illegal file sharing," Xie says. "I am actively working on this issue now, trying to come up with a general and effective solution that can be easily integrated into P4P."

As that issue is debated and worked on, those promoting P4P will continue to try to convince ISPs and P2P companies to work together to solve the Internet's problems with traffic flow.

"We now call what we do here a 'content delivery cloud'. . . because we're talking about all of the pieces in content delivery," Levitan says. "The big picture content delivery business is evolving. We've moved beyond Akamai having servers around the world. We're seeing the future is leveraging the resources in the most efficient way.

"When different players learn to coordinate with each other, there's better scalability, better performance, and lower cost."

The world's politicians could take a few lessons. ▲

by Kyle Schurman

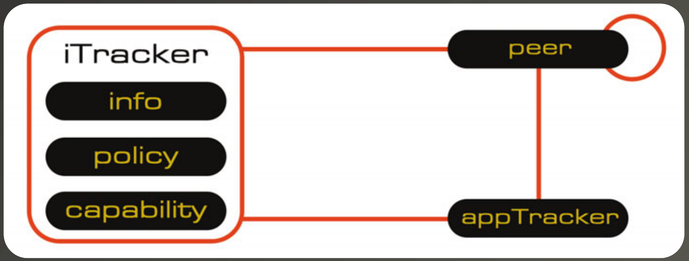
Breaking Down The iTracker

The iTrackers are the key components to making P4P a viable framework. Within the iTracker are three interfaces—info, policy, and capability—through which peers can make queries.

Info. For peers within an ISP network, the info interface allows them to obtain information about the network status and topology. A part of the info interface is the LOC, or geographical coordinate of the node. Through LOC, the iTracker can calculate the proximity of other peers on the network, which results in improved P2P efficiency.

Policy. Peers and appTrackers can use the policy interface to determine the policies of the network, which include information on how the ISP wants its networks to be utilized. The policy interface also provides information on the guidelines of the network, which include specific suggestions from the ISP for P2P to make efficient use of the ISP's network.

Capability. Peers and other content providers can work through the appTracker to make use of the capability interface, which provides information about the ISP's network capabilities. For example, if a particular network has a very popular on-demand service, the appTracker might make a request of the ISP's iTracker to allocate a server that can be used as a peer to accelerate P2P content distribution. ▲



Source: Yale University, Haiyong Xie

AMD's Quad-Core Phenom II

When released late in 2007, AMD's Spider platform had its issues, which company officials freely admit. Then again, if they didn't admit it, the critics haven't been bashful about pointing out the problems, most of which centered on the CPU included with Spider, called Phenom.

After taking a slap in the face from critics, companies can choose two directions:

Phenom II Architecture

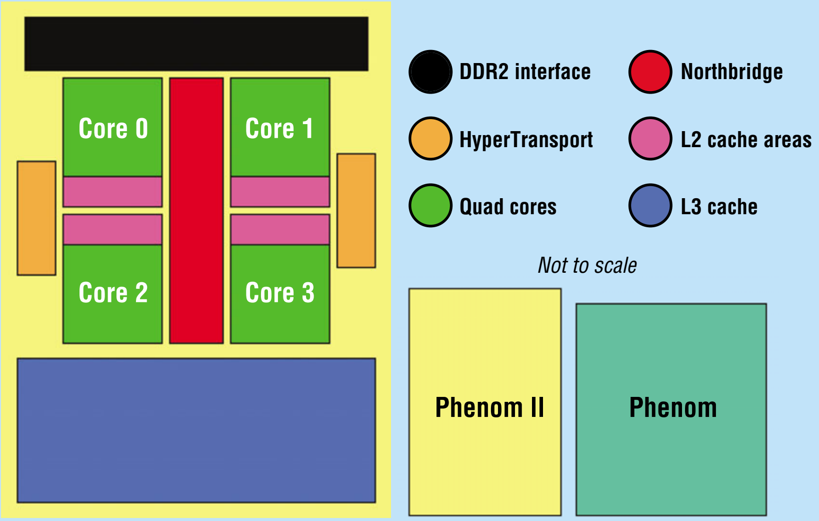
The overall architecture in Phenom II is similar to what AMD presented in Phenom, with a few tweaks.

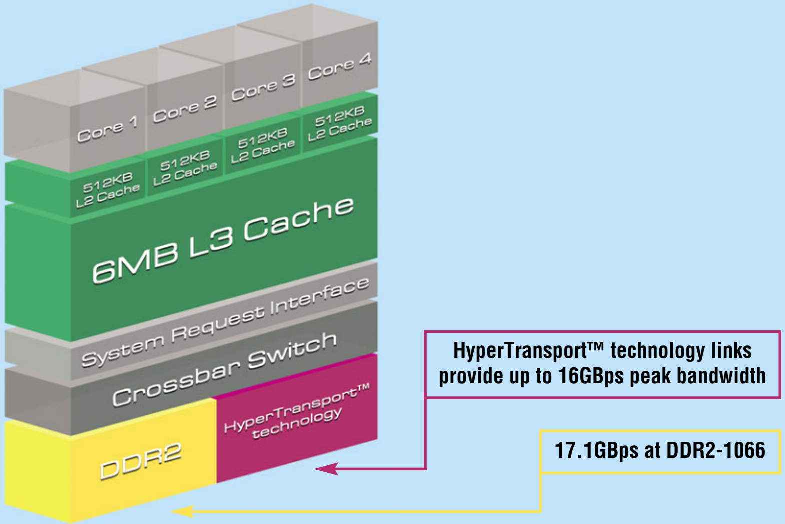
The primary change involves a new manufacturing process. Phenom II uses a 45nm manufacturing process vs. the 65nm manufacturing process with Phenom.

The L1 cache areas, contained within each core, remained the same size, with two 64KB cache areas per core (an instruction cache and a data cache). The four L2 cache areas, each linked to one of the chip's four cores, measure 512KB in both Phenom and Phenom II. The L3 cache area is shared by all four cores in both architectures, although Phenom II has 6MB of L3 cache vs. 2MB in Phenom. The smaller size of the L3 cache contributed to some of the problems with the Phenom design. With the 300% larger L3 cache in Phenom II, the overall system performance increases greatly because the cores have greater access to the most commonly used data.

Phenom II offers 758 million transistors in a 258-square-millimeter die size vs. 450 million transistors in a 285-square-millimeter die size for Phenom. Phenom II is more of a rectangular chip than Phenom, as shown in a comparison of the relative sizes and shapes of the two chips.

Between the HyperTransport bus and the memory bus, Phenom II offers a combined 33.1GBps bandwidth between the processor and the system, as you can see in the illustration here. ▲





Source: AMD

They can give up, ceding the market to a competitor, or they can battle through the problems. AMD chose to fight.

"There was a lot to improve upon from Spider, and we've learned a lot of lessons," says Simon Solotko, senior manager of AMD's desktop group. "You're always humbled by your customers."

The lessons AMD learned have yielded a new platform, called Dragon, and a new family of quad-core CPUs, called Phenom II.

Phenom II Release

At the launch of Phenom II at January's CES, AMD introduced two quad-core chips. Both chips make use of a 45nm manufacturing process, include 6MB of Level 3 cache, include about 758 million transistors, have a maximum TDP (thermal design power) of 125 watts, and contain the Deneb core.

The Phenom X4 940 Black Edition runs at 3GHz and sells for about $275 each. The Black Edition chip includes unlocked multipliers, which improve overclocking options. The Phenom X4 920 runs at 2.8GHz and carries a price tag of about $235 apiece. AMD will offer additional Phenom II chips throughout 2009, with varying prices and clock speeds.

"From an engineering perspective, it can deliver the goods," Solotko says.

Some of the highlights of the Phenom II configuration include:

- AMD's move to the 45nm manufacturing process
- An increase in the amount of L3 cache (6MB)
- Improved speed paths and signal tolerances
- Improved frequency and voltage controls within each core
- Introduction of Cool'n'Quiet version 3.0
- Decreased power consumption

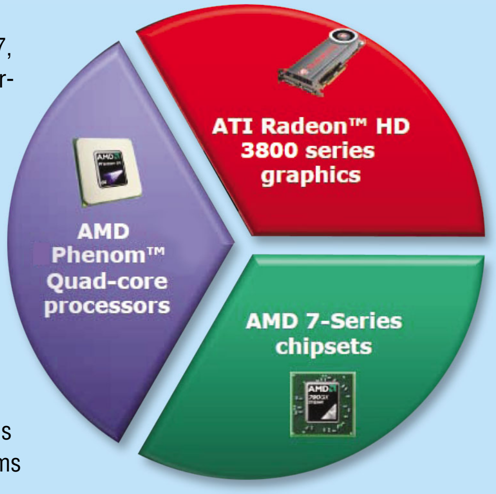
By introducing frequency and voltage control for each individual core in Phenom II, AMD is able to achieve impressive power savings.

"As a result, even under a moderate to heavy load, we're able to save 40% to 50% per core," Solotko says. "It's a very energy-efficient solution. It will be within the power envelope, even when applying multiple GPUs."

One of the biggest problems with Phenom involved its power consumption.

Spider vs. Dragon

AMD released its first platform containing only AMD components in November 2007, called the Spider platform. By creating a platform, AMD hoped to optimize the performance of all of the components.


ATI Radeon™ HD 3800 series graphics
AMD Phenom™ Quad-core processors
AMD 7-Series chipsets

Spider consisted of three components.

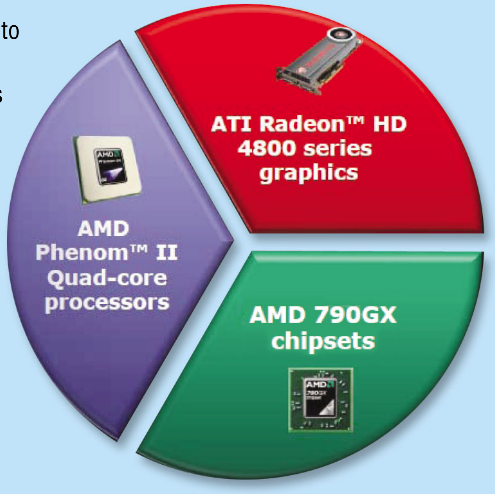
Chipset. AMD's 7-Series chipset included CrossFireX technology.

GPU. AMD's HD 3800 series graphics card was part of the Spider platform.

CPU. AMD's Phenom quad-core processor was based on a 65nm manufacturing process. It was widely considered the weak link in the Spider platform.

With Spider, AMD found some flaws, but Simon Solotko, senior manager of AMD's desktop group, says the company has been able to move forward from those problems with Dragon, especially with the migration from Phenom to Phenom II as the CPU.

"We had a great GPU and chipset," Solotko says. "With the Phenom II, we're able to complete the platform. We're giving enthusiasts something to be excited about. . . . It's extremely attractive to do-it-yourselfers. From an engineering perspective, that's nice to see."


ATI Radeon™ HD 4800 series graphics
AMD Phenom™ II Quad-core processors
AMD 790GX chipsets

The Dragon platform contains these three components.

Chipset. AMD's 7-Series is again the chipset with Dragon, which uses the 790GX.

GPU. AMD has upgraded Dragon to include the HD 4800 series graphics card.

CPU. The Phenom II CPU marks the biggest difference between Spider and Dragon. Phenom II involves a 45nm manufacturing process.

Source: AMD

It required a lot of power at the individual transistor level, which negatively affected performance and limited overclocking potential. AMD says it has fixed those problems. The company says Phenom II can use about 60% less power in idle mode than Phenom. AMD uses a few different techniques for decreasing the chip's power consumption.

Cool'n'Quiet. Version 3.0 of the technology includes additional power states, which help improve power efficiency.

Cache flush. When the Phenom II goes into idle mode, the chip's cores dump data from the L1 and L2 cache areas into the shared L3 cache area. With no data in L1 and L2, the chip can run individual cores at a lower speed, saving power.

Lower clock rate. Phenom II, when idle, can lower its clock rate to only 800MHz, which is significantly lower than the idle clock rate of 1.25GHz for the Phenom.

Core voltage. At idle, Phenom II's core voltage drops to 0.992 volts.

Final Verdict

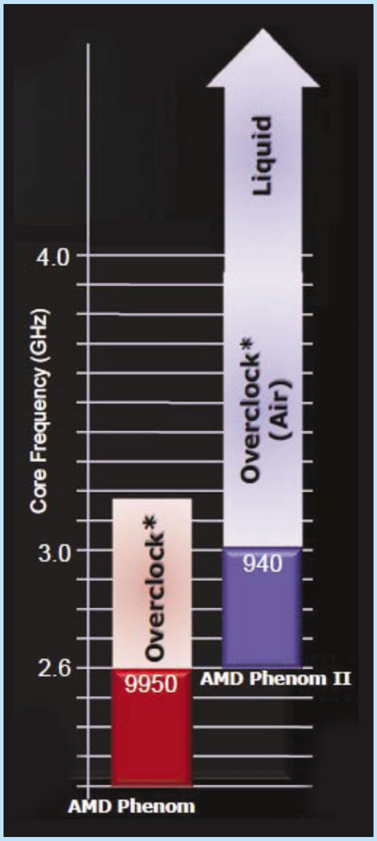
AMD clearly is aiming at the enthusiast market with Phenom II, especially with the 3GHz Black Edition, which provides strong overclocking capabilities.

"It's the right tool, right platform, and right processor, all at once, for enthusiasts," Solotko says. "We're going to have a lot of enthusiasts . . . who are going to be heavily attracted to Dragon. There's a lot of headroom. You're going to be able to press the limits in terms of total performance."

Initial reports from critics concerning the Phenom II have been favorable. However, as AMD already knows, it's the customers who will deliver the final verdict in the coming months, and it can be a positive experience . . . or a humbling one. ▲

by Kyle Schurman

Phenom II Overclocking



Source: AMD

AMD is not shy about touting the overclocking capabilities of Phenom II.

"We've hit the sweet spot in temperature," says Simon Solotko, senior manager of AMD's desktop group. "With Phenom II, there's no low temperature limit in the parts that we've found. Overclockers can throw out their temperature probes."

At various demonstrations late in 2008, Solotko says AMD reached an overclocking speed as high as 6.3GHz with Phenom II.

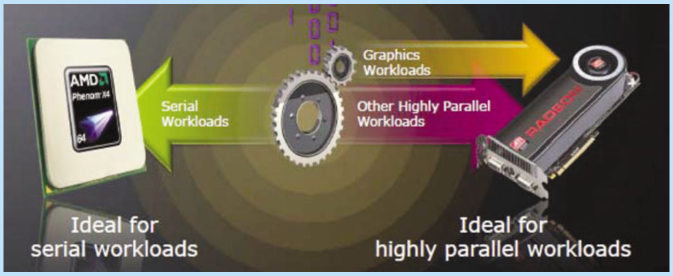
"It's a sign of the maturity of AMD64 technology that you can run the Phenom II overclocked to 6GHz," Solotko says. "It's a sign of the overall good design where we've controlled the signal tolerance."

Enthusiasts will be pleased, Solotko says, with the consistency of their overclocking with Phenom II.

"It was a great, repeatable result," Solotko says. "We had extreme cooling at extreme activity. It's great to have the attribute that, under extreme conditions, it can perform." ▲

Stream Technology

With Stream technology from AMD/ATI, the CPUs and GPUs in Dragon work together to provide the best possible balance between power and efficiency. With Stream, the GPU can perform processing functions unrelated to graphics whenever the GPU can perform the function better than the CPU. The CPU works best for serial-type processing, while the GPU works best for parallel processing.


AMD
Phenom X4
Serial Workloads
Graphics Workloads
Other Highly Parallel Workloads
RADEON
Ideal for serial workloads
Ideal for highly parallel workloads

Source: AMD

With Stream, "we're going to see tremendous performance improvements," says Simon Solotko, manager of AMD's desktop group.

For consumers, Stream works well in all three computing arenas: Productivity, entertainment, and gaming.

Productivity. Software, such as Adobe Photoshop and Microsoft PowerPoint, receives a boost from being able to tap into the processing power of the GPU for certain functions.

Entertainment. HD video-editing benefits greatly from Stream technology.

Gaming. By tapping into the powerful processing capabilities of the GPU, games offer more realistic AI, gameplay, and physics processing. ▲

AM3 Socket & DDR3 Memory

AMD focused on upgrading flexibility with the release of the Phenom II CPU, both in terms of the compatible socket and the compatible memory.

At its January release, AMD developed the Phenom II (named "STARS" in this graphic) and the Dragon platform for the AM2+ socket and for DDR2 memory. Throughout 2009, AMD will unveil upgrades to Phenom II, beginning with a model for the AM3 socket. Phenom II also will make use of DDR3 memory in the upcoming months.

AMD's decision to wait to begin offering DDR3 support in Phenom II was an easy one, because DDR2 still provides plenty of power at a good price, says Simon Solotko, senior manager of AMD's desktop group.

"DDR2 memory gives a great price-performance ratio," Solotko says. "Enthusiasts and builders are well served with DDR2 and aren't missing anything."

Solotko says he expects to see support for DDR3 built into Phenom II sometime around mid-2009, when DDR3 prices should be lower.

"The benefit it offers is marginal, but the cost of DDR3 is significantly higher," Solotko says. "There's no other real benefit...DDR2 offers a great experience at a great price."

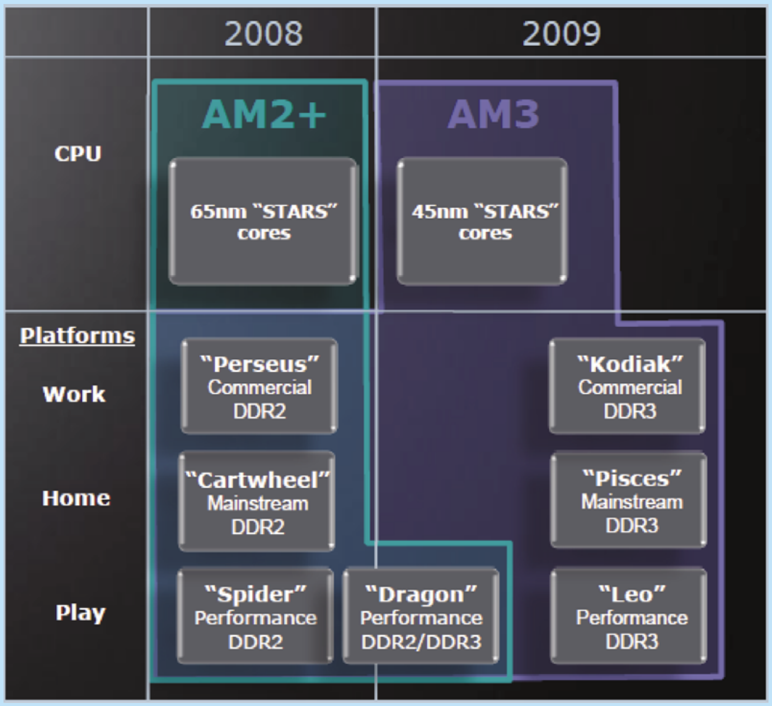
Even when Phenom II chips appear that are made for DDR3 and the AM3 socket, those chips will be backward-compatible with AM2 and AM2+ sockets, as well as DDR2 memory.

"We'll introduce DDR3 support when we feel the market is ready for it," Solotko says. "Phenom II also will have DDR2 backward compatibility, as part of our embracing a smooth transition."

By including backward compatibility with the AM2 and AM2+ sockets and motherboards, installing the Phenom II in an older computer should not cause too many compatibility problems, as long as the BIOS is updated properly. Most motherboard manufacturers have created compatibility lists for Phenom II if you're unsure about upgrading.

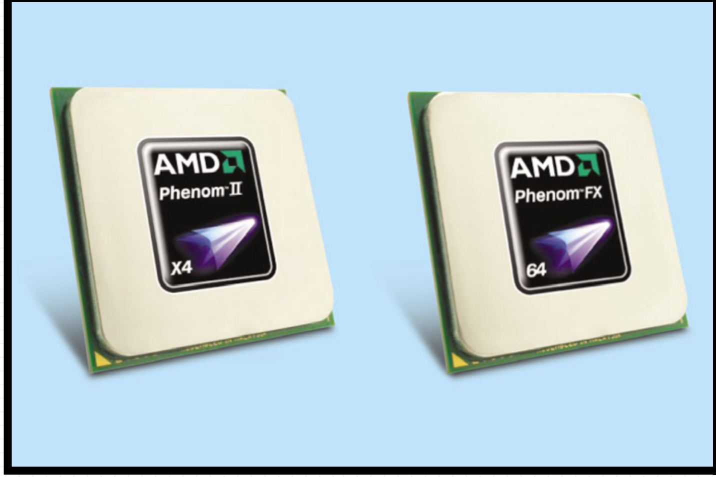
"Phenom II is compatible with the same infrastructure that's in the market today," Solotko says.

Finally, when AMD releases its AM3-compatible Phenom II processor, the company will release a new 800 series chipset for the desktop computer market, as well. ▲



Source: AMD

AM3 Socket & DDR3 Memory

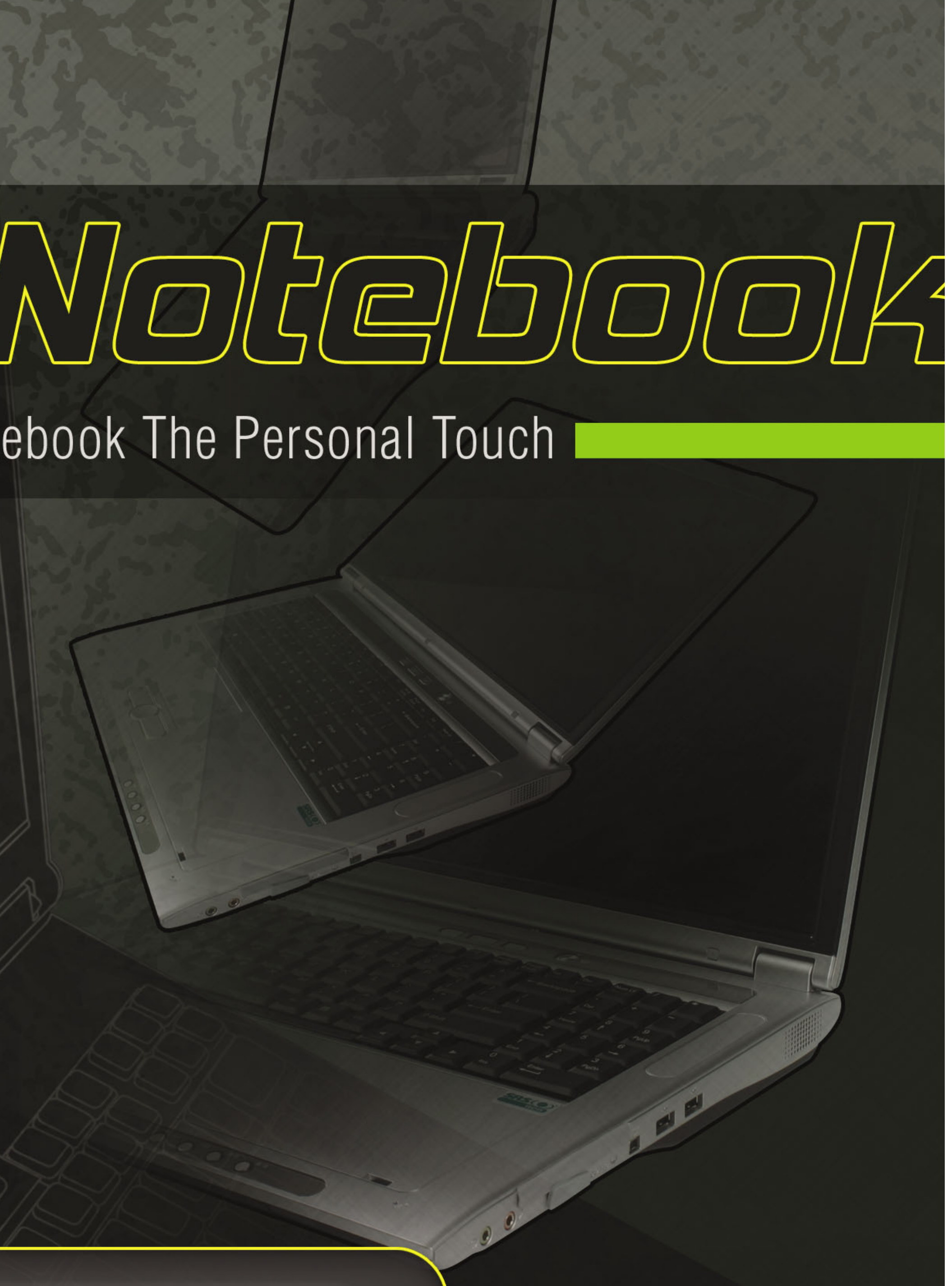


	Phenom II	Phenom
Release date	Jan. 8, 2009	Nov. 19, 2007
Manufacturing process	45nm	65nm
Highest clock speed	3GHz	2.6GHz
Die size	258 sq. mm	285 sq. mm
Transistors	758 million	450 million
Core	Deneb	Agena
L1 cache	64KB/64KB	64KB/64KB
L2 cache	512KB	512KB
L3 cache	6MB	2MB
Maximum TDP	125 watts	140 watts
Interconnect	HyperTransport	HyperTransport
Power savings	Cool'n'Quiet 3.0	Cool'n'Quiet 2.0
Virtualization	Pacifica	Pacifica
Cost at release	$235-$275	$251-$283

Source: AMD, Tom's Hardware

DIY Notebook

Give Your Next Notebook The Personal Touch



62 **The Parts List**
How To Do DIY

68 **Build Your Own Notebook**
Case Study: OCZ's 17-inch DIY17A2 Gaming Notebook

Game Plan

As far as system building goes, we've seen plenty of battle-hardened desktop builders who have cut their teeth on ATX case after ATX case. These veterans were slapping systems together when "tool-less" meant trying to build a system without a screwdriver; they wouldn't give a second thought to buying a rig from a store shelf.

Of course, laptop computers traditionally haven't been as welcoming as their full-sized counterparts. To be sure, you could upgrade your system memory or replace a hard drive with relative ease, but you were essentially locked in to the other core components at the point of purchase. But this, too, is changing in favor of custom builders. The DIY notebook landscape is nothing like it was a few years ago.

The rapidly advancing notebook market in general is arguably at least partially responsible for this evolution. DTRs (desktop replacements) proved that you could take plenty of PC power with you (provided you were willing to lug along a brick-sized wall wart and remain tethered to a socket). On the other end of the spectrum, netbooks quickly have become the oft-used sidearms in power users' arsenals. Thin, light, and often Spartan in terms of hardware, netbooks first invaded the scene in 2007 with Asus' Eee PC and are now available from a Who's Who of OEMs.

Suddenly, power users have plenty of portable options, so it makes sense that hardware makers want to further entice us with laptop shells we can take and craft into portable systems that are custom-built to our individual tastes. Barebones models typically let you pick your processor, GPU, and other components; actually installing the components isn't as complicated as you might think.

Interested in rolling up your sleeves and tackling a custom notebook build of your own? You'll need a shopping list. Because customizable shells give you so many options, you can determine, piece by piece, what you want in your portable rig. And the pieces these days virtually scream "custom notebook." Low-watt processors give you plenty of punch without punching out the laptop's battery. For builders with an unlimited budget, slip in an ultra-quiet SSD. Hell, slip in two. We break down which components we think belong in your build. Whether you're shooting for infinitely portable or infinitely powerful, you'll find what you need starting on page 62.

Now that you have that pile of parts on your desk, let's get to work. Actually, we'll get to work first on an OCZ Technology DIY 17-inch Gaming Notebook, and you can look over our shoulders as we put everything together. Seth Colaner gives you an illustrated look at what you can expect when you crack open the box, and subsequently the shell itself, for the first time. Check it out on page 68. Your shell and components might be different, but you'll have a leg up when you finally undertake your own build.

You'll also want to take a look at this month's Mod Project (page 40), especially if you already have a netbook and want to give it a custom OS installation. We take an Eee PC, wipe it clean, and reinstall Windows XP Pro, *CPU*-style, because even netbooks can stand a little customization.

We know that you like to do it yourself whenever possible. With all of the options available to homebrew laptop builders today, make your next build a portable one. ▲

by Vince Cogley

Parts List

How To Do DIY

So you want to build a notebook—good for you. Tricking out your own notebook is a great way to ensure that the parts you want are in the machine of your choice. If you've built your share of desktop machines from scratch, putting together your own notebook probably sounds like a fun challenge.

Be aware, however, that building a notebook is a different beast. It's not just a matter of fitting all the components into a smaller form factor. Working on a desktop build is like working on an older American-made car, in that there is always ample room to work. If you've ever been fortunate enough to spend time under the hood of a late-'70s Chevy Nova, you know that there's almost enough room for you to stand inside the engine compartment as you work.

However, working on a notebook is more akin to trying to replace an engine part in a late model import. In some cases, it's just not worth it to try and do it yourself. (A word of advice: If the starter on your 1993 Subaru Impreza ever goes south, just tow it to the dealer and let them deal with it.) To get to certain components, you have to remove other parts—parts that you've never seen before. It can be a nerve-wracking process.

But the upside of a barebones notebook build is that the manufacturer already did that hard, time-consuming work for you. The motherboard and most of the other components are already installed. All you have to do is slap in a few additional parts. The tricky part is figuring out which parts you want and finding a barebones system that will accommodate them.

The Barebones Notebook

Unlike desktop PCs, where you often select a chassis *after* choosing your components, the case is by far the most important item to consider when you want to build your notebook.

Partly, this is because the barebones notebook case already contains the motherboard. With notebooks, you can't remove or replace the motherboard as you can with a desktop, so you're stuck with the motherboard included with the notebook shell you choose. And, of course, the motherboard determines which type of CPU you can use, how much RAM you can add, and which type of graphics and audio you can play with.

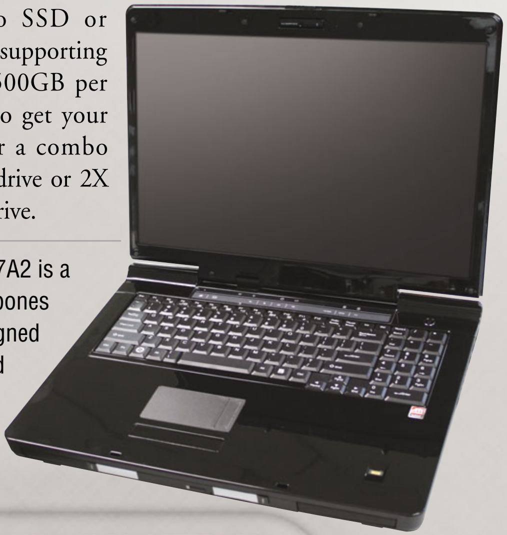
Further, the case determines the screen size, most of the weight of the computer, your battery options, the quality of the speakers, and so on. Be sure you choose the ideal notebook case before you even think of buying any other components.

Available shells range in size, capability, and price. Some are designed to be tricked-out gaming machines, while others are desktop replacements or lightweight machines optimized for portability.

OCZ DIY17A2

$1,699.99 (at www.newegg.com) | www.ocztechnology.com

Though many barebones notebooks let you customize several components, the 17-inch OCZ DIY17A2 comes equipped with everything but the CPU, memory, and hard drives. Yes, plural hard drives—there are slots for two SSD or SATA drives, supporting a maximum 500GB per drive. You also get your pick of either a combo DVD optical drive or 2X Blu-ray Disc drive.



The OCZ DIY17A2 is a high-end barebones notebook designed for gaming and serious multimedia applications.

Running on the Intel PM45 + ICH9M chipset and supporting Intel Core 2 Duo or Extreme processors, this notebook also boasts ATI HD 3870 graphics with your choice of a single GPU or CrossFire. For RAM, you can install up to 8GB (2x 4GB) of dual-channel DDR3-1333 memory with Intel XMP support.

You can opt for the 802.11b/g WLAN adapter, but there's no need to be conservative about your wireless options when you can have an Intel 5300 802.11b/g/draft N adapter instead.

You can also make some fine additions to your machine with the ExpressCard 34 and media card slots and the eSATA and HMDI ports.

MSI MS-1721

$1,147.46 (at www.avadriect.com) | www.msicomputer.com

Modders, gamers, and other PC enthusiasts deeply value the ability to customize a system for high performance. The MSI-1721 is a 17-inch WSXGA+ (1,680 x 1,050) gaming notebook with features that allow you to do just that. This is an AMD-based system that operates on the ATI RX781 + SB700 chipset and supports AMD Socket 1 Griffin processors.

For graphics power, you get the ATI Mobility Radeon HD 3850 (M88) with 512MB of VRAM, as well as support for up to 4GB (2x 2GB) of DDR2-800/667 memory. The machine supports SATA hard drives and sports a SuperMulti optical drive, as well as a 4-in-1 SD/MMC/MS/MS Pro card reader.

The MS-1721 has Bluetooth 2.0 and Gigabit capabilities, and you can add a WLAN card to go wireless. The built-in 2MP Web cam is another also nice touch.

Clevo M762S

$767.35 (at www.avadirect.com) | www.clevo.com.tw

High-end and gaming notebooks aren't the only barebones kits you can buy. For those who just want a midrange machine to customize to your preferences, consider the Clevo M762S. Operating on the SiS M672 + SiS 968 chipset and powered by your choice of Intel Core 2 Duo or Intel Celeron processors, the M762S is a compact shell with a 15.4-inch WXGA (1,280 x 800), WXGA+ (1,440 x 900), or WSXGA+ (1,680 x 1,050) screen.

The M762S supports up to 4GB of DDR2-667RAM. Despite the smaller size compared to the gaming notebooks, you can still play DirectX 10 games thanks to the SiS M672 integrated graphics, which use a 256MB shared-memory architecture.

The M762S also includes a combo/SuperMulti optical drive, one slot for a SATA hard drive, and a 7-in-1 card reader. In terms of connectivity, this notebook is loaded: A Gigabit Ethernet port comes standard, and you can add an 802.1b/g card. Available factory options include Bluetooth 2.1, a 1.3MP or 2MP Web cam, and a built-in 3.5G MiniCard module that lets you connect to the Internet over UMTS/HSDPA.

MSI MS-1233

$599 (at rkcomputer.net) | www.msicomputer.com

The MSI-1233 is a lightweight shell (just 3.5lbs. without the components installed) with a 12-inch WXGA (1,280 x 800) LCD screen. It supports Intel Penryn 45nm Socket P processors and runs on the Intel GM45 + ICH9-M chipset. Depending on the configuration, you can pump up this little guy's performance with up to 4GB of RAM (2 x 2GB).

The graphics engine is embedded GMA X4500. A SuperMulti drive (with DVD-RAM burning) is built in, as is a SD/MMC/MS/MS Pro 4-in-1 card reader. Swap in the SATA hard drive of your choice for storage, and add some extra features to the shell via the two PCI-E Mini slots.

The MSI-1233 also features Gigabit Ethernet, support for a WLAN card (which would occupy one of the PCI-E slots), Bluetooth 2.0, and a 2MP Web cam. For some added security, this barebones notebook also offers a biometric fingerprint sensor.

Mobile CPUs

Both Intel and AMD have been churning out some impressive mobile processers over the last few years. The term "mobile" may have once had the connotation of "weak" when it came to processing power, but those days are gone. And they won't drink your battery power as much as you might think.

Intel

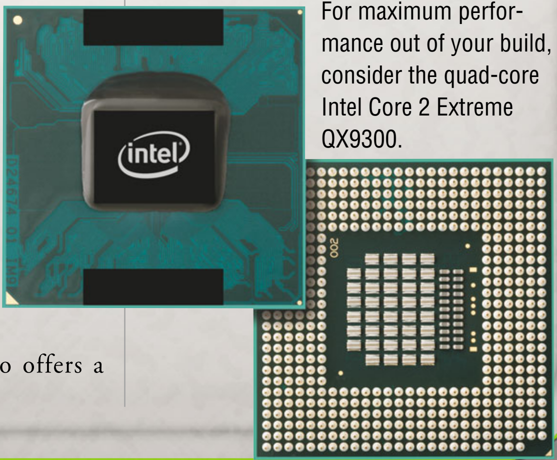
Intel currently has two families of mobile processors: Core 2 Extreme and Centrino 2-based processors. The former is designed for gaming and multimedia applications, while the Centrino 2 processors are mostly Core 2 Duos that have been optimized for wireless performance and prolonged battery life.

These are fairly sizable families: The Core 2 Extreme family includes processors in the QX9000, X9000, and X7000 series, while the Q/T/P9000, P8000, P7000, and SP/SL/SU9000 all sport Centrino 2 technology. Most of these are dual-core, but the QX9000 series, Q9000, and Q9100 are quad-cores. With the exception of the X7900 and X7800, which are built with the 65nm process, all of Intel's mobile processors are 45nm.

Intel Core 2 Extreme QX9300

$1038 | www.intel.com

The QX9300 is Intel's top-of-the-line mobile processor, with a clock speed of 2.53GHz, 12MB shared L2 cache, and a 1,066MHz FSB. It also features Dual Intel Dynamic Acceleration, which is



For maximum performance out of your build, consider the quad-core Intel Core 2 Extreme QX9300.

designed to boost active core frequencies by tapping into idle cores, as well as support for Intel XTU (Extreme Tuning Utility) and Intel XMP (Extreme Memory Profiles) overclocking tools. And although it's not optimized for mobile communications, the QX9300 features built-in WiMAX capabilities.

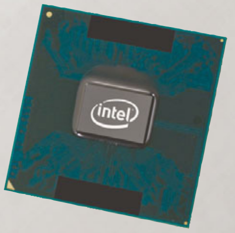
Good luck trying to find a better mobile gaming processor. With a TDP of 45W, it's not exactly an energy hog, but if your priority is battery life and energy consumption, go with one of the Centrino 2-based CPUs instead.

Intel Core 2 Duo SP9400

$316 | www.intel.com

If you're looking for a mobile processor with seriously low power draw that still performs well, the SP9400 is a prime candidate. This dual-core chip is clocked at 2.4GHz with a 6MB of L2 cache and a 1,066MHz FSB, all on a 45nm process.

The SP9400 also supports 64-bit systems and features Enhanced Intel SpeedStep technology, which throttles power according to CPU load. With SpeedStep and a max TDP of just 25W, expect longer-lasting battery life.



For lighter Intel-based notebooks, the Intel Core 2 Duo SP9400 will be plenty of processing power.

AMD

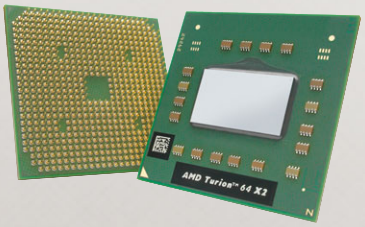
AMD's lineup comprises the Turion, Athlon, and Sempron families. There are dozens of processors under these umbrellas, though it's not so easy to find them all from online vendors. AMD doesn't yet have any quad-core mobile processors (though the chipmaker reportedly will within the next couple of years), but its catalog boasts plenty of single-core chips for ultra-thin notebooks (Sempron) and dual-cores for midrange (Athlon) to high-end systems (Turion).

AMD Turion 64 X2 Ultra Dual-Core (ZM-86)

$324.80 (at www.avadirect.com) | www.amd.com

The Turion 64 X2s are AMD's best and brightest mobile processors, and the ZM-86 has the highest clock of the bunch at 2.4GHz with a 65nm process and a TDP of 35 watts. For greater efficiency, the TL-68 utilizes AMD's PowerNow! Technology, which extends battery life by throttling power based on CPU load.

The ZM-86 is ideal for high-end systems, with a lot of media applications and multitasking.



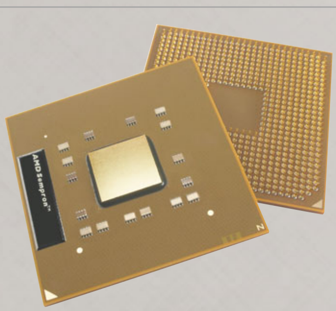
The AMD Turion 64 X2 Ultra Dual-Core (ZM-86) is currently AMD's most powerful mobile processor.

AMD Mobile Sempron 4000+

$145.99 (at www.buy.com) | www.amd.com

What separates the Sempron processors from the pack is the price—these things are dirt cheap, even for the top-of-the-heap 4000+. True, they're only single-core chips, but for a budget ultra-light notebook build, who cares? You'll still get the performance you need out of the 2.2GHz, 65nm Sempron 4000+.

The 31W rating is slightly off-putting, as the beefier ZM-86 draws just 4W more. Intel's lighter chips consume much less.



The AMD Mobile Sempron 4000+ is a single-core processor for ultra-light notebooks.

Mobile GPUs

Mobile graphics have come a long way from where they were just a few years ago. Integrated graphics were a laughable substitute for desktop-level graphics and part of the compromise of owning a notebook.

These days, integrated graphics offer decent performance and consume little power. If you want stellar gaming performance though, you'll need to get a barebones notebook with a discrete card (or two, if the computer is equipped with SLI or CrossFire technology).

You can't buy a standalone graphics card for your notebook; even if you get a system with a discrete card, it will have to be built into the case. The reason for this is that cooling mobile graphics cards is trickier than their desktop counterparts, and the engineers that design a case have to be creative about where to put the fan and heatsinks. Because of a notebook's form factor, you can't just slap a fan on the GPU and call it cool.

In short, the graphics module that comes with your barebones notebook is the one you're stuck with. Make sure you choose wisely when selecting and configuring a system.

If you're building a lightweight notebook for typical computing tasks and mobility, you'll be fine running just the integrated graphics. Both Intel and AMD have chipsets that support decent graphics processing, so you only need to go discrete if you want to game or use intensive multimedia applications, such as photo or video editing.

ATI Mobility Radeon HD 4870

ati.amd.com

AMD/ATI's best and brightest mobile graphics adapter is the Radeon HD 4870, which features CrossFireX multi-GPU technology for gaming and Blu-ray movie watching. The 4870 can be configured with up to 1GB of GDDR5 and supports Dual DisplayPort, HDMI, and 7.1-channel surround sound. It's also designed for an efficient power draw with ATI PowerPlay technology, so it won't kill your battery as fast as you might think.

ATI Mobility Radeon HD 3670

ati.amd.com

The 3000 series is one step down from ATI's 4000 series of discrete graphics and is designed for thin-and-light notebooks. It will still support DirectX 10 gaming and Blu-ray, as well as CrossFireX technology. With a rating of 30W, it's a low-power option if you want decent graphics performance.

Though the ATI Mobility Radeon HD 3670 is designed for thin-and-light notebooks, you can still watch HD movies and play DirectX 10 games.

Nvidia GeForce 9800M GTX

www.nvidia.com

The 9800M GTX features Hybrid SLI to combine the power of integrated and discrete graphics. This card is designed for big machines and serious gaming with 1GB of GDDR3 technology. It's a bit of a gas hog at 75W, but the power drain should be mitigated by its power-throttling HybridPower technology.

Nvidia GeForce GT 130M

www.nvidia.com

The GT 130M is no slouch, with up to 1GB of DDR2 or DDR3 and a 128-bit memory interface. It's also SLI-ready and is equipped with PowerMizer Power Management and HybridPower technologies to optimize battery life and power distribution.

Notebook RAM

Notebook memory is one of the easiest components to select when you're building your own barebones system. Primarily, this is because it's common for the average user to add memory to his notebook. Hence, the process is relatively streamlined. All you need to do is determine how many memory slots your shell has, what type of memory it supports (DDR2 or DDR3), and what the maximum supported speed is. RAM is easy to find online, as virtually every vendor that sells computer components will have it.

OCZ OCZ3M13334GK

$129.99 (at www.newegg.com) | www.ocztechnology.com

This 4GB (2x 2GB) PC3-10666 DDR3 SODIMM kit from OCZ is designed for gaming and other memory-intensive applications. The SODIMMs are unbuffered and have a 1,333MHz clock at 1.5V.

Kingston KHX5300S2LLK2/4G

$74 (at www.kingston.com) | www.kingston.com

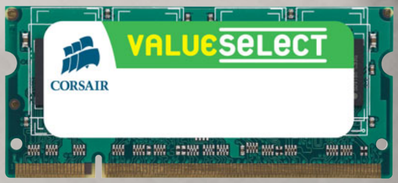
Kingston touts this dual-channel memory kit as high-performance. Certainly, this 4GB (2x 2GB) kit of 200-pin DDR2-667 CL4 SDRAM will do the trick for a gaming system, but it might be better suited in a midrange system.

This dual-channel 4GB Kingston RAM kit will work well in a gaming or midrange system.

Corsair VS2GSDSKIT667D2

$24.99 (at www.newegg.com) | www.corsair.com

Technically, this is "value" memory, but it would fit nicely in a midrange system in need of a little performance nudge. The PC2-5300, 200-pin DDR2-667 sticks (2x 1GB) would be plenty of juice for a nongaming system.



A steal at under $25, this 2GB Corsair DDR2 memory kit will perk up any midrange system.

Hard Drives

Deciding on a hard drive (or multiple hard drives, as the case may be) is mostly a matter of preference. If you're building a gaming notebook or DTR, you're probably going to want to maximize your storage capacity without sacrificing speed. For example, don't bother springing for the 500GB hard drive if it's going to be slower than 7,200rpm, unless your first priority is storage capacity.

Don't forget about the possibility of using an SSD hard drive if the notebook will support it—if capacity (or cost) isn't so much of an issue for you, a more expensive but higher-performing SSD may be ideal for you. For a midrange or ultralight build, an SSD is a smart way to cut down on weight.

Western Digital Scorpio Black 320GB

$89.99 (at www.newegg.com) | www.wdc.com

The 320GB Scorpio Black SATA hard drive from Western Digital is a smart choice if you want to balance speedy performance with ample storage. This 7,200rpm drive features a 16MB cache and a host of technologies that enhance durability, prevent damage, optimize power consumption, and minimize noise.

Samsung 2.5-inch 32GB SSD (MCBQE32G5MPP-0VA)

$299 | www.samsung.com

Samsung makes a mean SSD. If you're looking to get some extra performance and reduced weight from your hard drive (and don't mind the diminutive storage capacity), this 32GB SSD is for you. It's far pricier than a regular hard drive, but it does deliver impressive performance with a 3Gbps SATA connection and low power consumption.

Seagate Momentus 5400.6 500GB (ST9500325AS)

$99.99 (at www.newegg.com) | www.seagate.com

The Seagate Momentus 5400.6 drive isn't going to be setting any speed records, but for mobile storage capacity, it's hard to beat 500GB. The 5,400rpm drive with 8MB cache will deliver decent performance with low power consumption and noise. To prevent damage, it also features shock protection and drop sensor technology.

Optical Drives

Selecting an optical drive is kind of a gray venture, mostly due to the fact that most barebones notebook kits come with the optical drive already installed. In some cases, you're able to specify which drive you want out of a few choices, but if your barebones system has an empty bay for an optical drive, you'll need to decide what drive to get. Of course, you can always remove the preinstalled drive and put in a new one, but then you're left with a perfectly good optical drive and nowhere to put it.

For many notebooks, all you want may be a DVD player with CD burning capabilities, but for high-end systems, look for a Blu-ray drive with all the trimmings. Whatever direction you decide to go, make sure the optical drive is compatible with your system before you buy.

Sony Optiarc BC-5500S

$309.00 (at www.newegg.com) | www.sonynec-optiarc.com

This little optical drive can read just about every Blu-ray, DVD, and CD format. It burns DVDs and CDs, as well.

LG GSA-T10N

$110.49 (at www.zoomtek.com) | usa.lge.com

This slim SuperMulti drive can read and write virtually any DVD and CD format. It supports dual-layer DVDs, as well—perfect for anyone with basic optical drive-related needs. ▲

by Seth Colaner

Shopping For DIY Components Online

So now that you're ready to buy a barebones notebook and all the accompanying components, you need somewhere to go to find them all. Because notebook components are more specialized than desktop components, they're a bit harder to find. Poring over manufacturer Web sites to figure out which shell and which parts you want is one thing, but it's quite another to actually find someone who can sell you those items. You essentially need to turn to the Internet. You'd be hard-pressed to find much of what you need at your local computer retailer.

For some components, such as memory and hard drives, you can usually find what you need through sites such as www.newegg.com or www.tigerdirect.com. But there are a few retailers that specialize in DIY components. At these sites, you'll find a better selection for some of those hard-to-find components. Their prices are comparable to each other, but to find the best deal, you might want to do some comparison shopping.

Directron

www.directron.com

Directron offers several barebones notebook kits, and for $27, the retailer actually assembles it for you with your chosen parts. Directron makes it easy to figure out which parts you're going to need with a handy checklist for barebones builds, complete with links to the various types of components. The site offers a wide selection of processors, hard drives, optical drives, and memory.

Shipping Options: Most shipments are via UPS, but FedEx and USPS are also available

Return Policy: You can return processors, memory, and software within seven days by filing an online Return For Credit form. Other products can be returned the same way within 30 days, except opened software, used computer cases, and special orders. In some cases, you may have to pay a restocking fee.

AVADirect

www.avadirect.com

You can choose your barebones notebook system based on the type of platform or processor you want—Centrino, Centrino Duo, or Turion X2—and there are plenty of models to choose from. You'll have no trouble finding a processor, hard drive, and memory. The options for optical drives are not as numerous, though.

Shipping Options: Primarily UPS, but also FedEx, DHL, and USPS

Return Policy: Within 30 days, you can return any unmodified custom product in the original packaging for a 15% restocking fee. Noncustom products must be returned within 25 days and are subject to a 30% restocking fee. Shipping fees aren't refundable.

R&J Technology

www.rjtech.com

R&J has a nice selection of barebones systems that run the gamut from large 17-inch shells to 14 inches and smaller. You can find some notebook hard drives, optical drives, and memory available, as well.

Shipping Options: UPS or USPS, in some cases. Some ground shipping is free.

Return Policy: You can return products in their original packaging within 15 days with an RMA form. Shipping fees are not refundable. ▲

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Build Your Own Notebook

Case Study: OCZ's 17-inch DIY17A2 Gaming Notebook

We get it: You want to own a good notebook, but the do-it-yourselfer inside gives you pause. Most people see a notebook as an expensive machine that should never be modified, but you can see how some racing stripes and a few better components would make that same computer personal and powerful.

Besides that, you don't want to be locked in. One of the perks of owning a PC is that you can swap parts in or out without having to buy *all* new components. If you like a certain case, it can continue to hold the guts of many different computers over the years. If you need a performance boost to school your LAN party friends, you can upgrade just about any component—memory, hard drive, CPU, GPU, and so on.

Any hardcore gamer or modder will find something he or she would change about virtually any notebook, even the most high-end models. Barebones systems give you the opportunity to configure important aspects of a notebook to suit your discerning tastes.

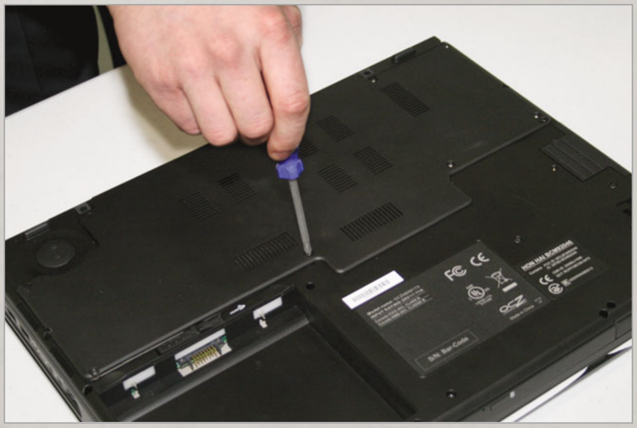
The Options

There are plenty of barebones systems available from online retailers, and they range in size and specs from ultra lightweights with 12-inch screens to big 17-inch gaming beasts. The big-name manufacturers of barebones notebooks, also called whitebooks, include OCZ, MSI, Asus, Clevo, and Compal.

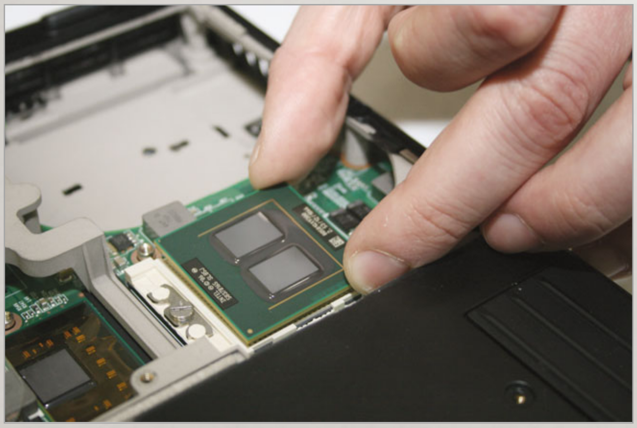
A variety of AMD- and Intel-based systems are available in virtually every notebook form factor and include both companies' latest mobile chipsets and processors, as well as the latest graphics adapters from ATI, Intel, and Nvidia.

Currently, Intel's family of Core 2 Extreme and Centrino 2-equipped Core 2 Duos and AMD's rather extensive mobile Turion, Athlon, and Sempron families are the CPUs of choice. Some of these are single-core chips for ultra-thin notebooks; many are dual-cores, but a handful are actually quad-core processors.

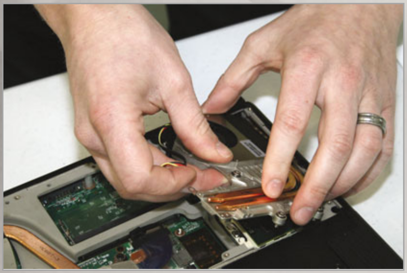
Integrated graphics options from both Intel and AMD are continually improving, but you can get barebones systems with discrete adapters for serious gaming and multimedia performance.



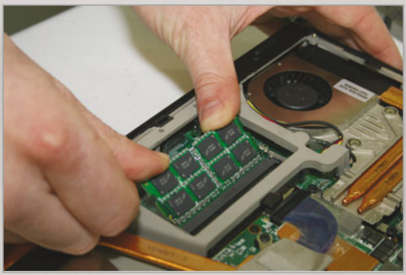
The back panel that houses the CPU socket and memory slots is held on by eight screws.



We made sure to seat the processor properly and secure it with the small screw just above it.



The heatsink, which came with a thermal pad already stuck to its underside, fit neatly into the CPU compartment.



The memory modules fit into their slots at an angle. We had to apply gentle but firm pressure to seat them correctly and then snap them into place with the retaining brackets.

After installing the CPU and memory, we replaced the back panel.

Most of these systems support more-than-sufficient memory and storage options. The motherboards in these systems commonly support up to 4GB of RAM, and you can slap in hard drives with 500GB or more capacity. In some cases, you may even have more than one hard drive bay to work with.

Optical drives are kind of a wild card in barebones systems. You can replace them easily enough, even though most whitebooks come with one pre-installed. Other features, such as integrated Web cams, fingerprint sensors, a subwoofer, and other enticing extras vary greatly by notebook type and manufacturer and generally can't be altered. Thus, be sure the whitebook you choose has all the extras you need.

If you're in the market for a customizable notebook of any type, putting together a barebones system is completely feasible. For this case study, though, we wanted to put together a big, mean gaming notebook.

The Kit

We decided to go with the OCZ DIY17A2, a 17-inch gaming notebook with all the trimmings. All we had to add was the processor, some storage, and the memory, though it's worth noting that many barebones notebooks let you to add more components. Still, many of the options, such as the WLAN adapter, were ones we could preconfigure with the order.

The OCZ DIY17A2 came in a moderately-sized rectangular box. Inside was a smaller box containing the battery, power adapter, CPU heatsink, hard drive trays, and a driver disc. Beneath that box was a big, black, shiny notebook.

The trackpad and mouse buttons were offset rather far to the left. Apparently, this is to accommodate the fingerprint sensor (which is very cool in and of itself). Further, although the shiny black finish looks smoking hot sitting there by itself, fingerprints, smudges, and dust have a way of showing up uninvited. Be sure to keep a soft cloth handy (such as the one that is conveniently included with the kit) to keep the case's finish looking brand new.

We also noticed that this computer is heavy—9.5 pounds without the battery, which by itself adds another pound or two. For LAN parties, this is wonderfully por-table, though you probably wouldn't want to carry it around over your shoulder for hours at a time.

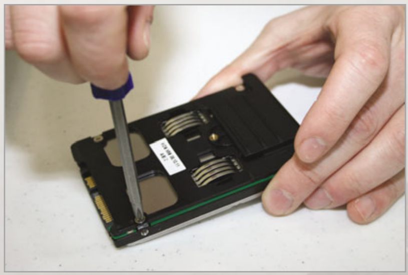
Otherwise, it's a sharp-looking computer; even the screen is a shiny black. After admiring it for a while, we flipped the DIY17A2 over and opened it up.

The Build

To put the kit together, the only tools we needed were Phillips- and flathead screwdrivers, and a set of nimble fingers to handle all the tiny screws and work in such a small space. A word of advice, though: If your fingers are not so nimble, consider having a pair of needle-nose pliers handy (unless your fingers are smaller than the digits of a small child). We had to go fishing in the case for one errant screw that we dropped.

For our components, we went with the 2.53GHz Intel Core 2 Extreme QX9300 for the CPU, 4GB dual-channel OCZ PC3-10666 DDR3 kit for memory, and an 80GB Intel X25-M SATA SSD and 500GB

Pictured is a top and bottom view of the two hard drive trays.



We secured the two hard drives to their respective trays with four screws each.

We tilted the notebook on its side to make installing the hard drives easier.

Western Digital Scorpio Black SATA hard drive for storage. (For more details on each component, see the "Components" sidebar.)

Once we had our parts all together, it was time to go to work. We started by turning the notebook over to access the panels covering all the innards. One large panel held down by eight screws covered the CPU socket and RAM slots.

With the cover off, the CPU socket was easy to locate. As with any processor installation, we were careful to orient the CPU in the socket properly. Instead of having a little clamp arm to lock the processor into place, the socket had a small screw with a notch on it. After we seated the processor correctly, we had to turn the screw about a quarter-turn to align the notch with a lock icon on the socket.

Next up was the CPU heatsink. The heatsink came with a convenient thermal pad stuck to its underside and covered by a protective piece of plastic. It was obvious how to place the heatsink in the case, as there was a compartment shaped just like it. We removed the protective plastic sheet and slid it into its spot. It required six screws to secure in place. Finally, we attached the tiny power connector for the CPU fan to the motherboard.

We installed the memory as we would in any notebook. There were two keyed slots just to the right of the CPU and heatsink. SODIMMs are keyed to fit only one way; don't force them in unless you have them oriented correctly. Both SODIMMs needed to be firmly inserted at an angle and snapped down into place with gentle but even pressure. It's important to be sure the SODIMMs are in all the way; the retaining clips will keep them from falling out, but if they're not seated properly, you'll get nothing when you first boot the computer except for maybe some static damage.

There are two bays with trays that fit 2.5-inch hard drives. Using the mounting

Components

We had our choice of what to include in this build as it pertained to storage, memory, and the CPU. We decided to go all out.

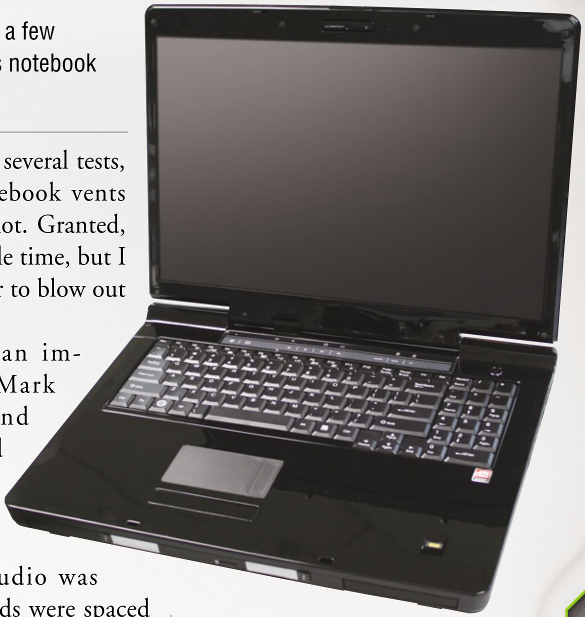
CPU			
Intel Core 2 Extreme QX9300	$1038	www.intel.com	-2.53GHz -1066Mhz FSB -12MB L2 cache -45W TDP
Memory			
Dual-channel OCZ PC3-10666 DDR3	NA	www.ocztechnology.com	-4GB (2x 2GB) -1,333MHz -Unbuffered -204-pin SODIMM -1.5V
Storage			
Intel X25-M SATA Solid State Drive	$595	www.intel.com	-80GB capacity -SATA 3Gbps -5V -2.5-inch form factor -Read: 250MBps; Write: 70MBps
Western Digital Scorpio Black (WD3200BEKT)	NA	www.wdc.com	-320GB capacity -7,200rpm -16MB buffer -5.5ms latency -SATA 3Gbps

Specifications

We didn't skimp on our DIY build—this "barebones" notebook is anything but. Listed below is everything that came with the DIY17A2.

Display	17-inch WUXGA (1,900 x 1,200)
Dimensions	1.75 x 15.5 x 11.75 inches (HxWxD)
Weight	9.5 pounds (without battery)
Chipset	Intel PM45 + ICH9M
Graphics	ATI HD3870 w/512MB (M88XT) CrossFire
Optical Drive	24x CD-R/RW, 8xDVD+/-R, 6x DVD+/-R DL Combo DVD Drive
Media/Slots	4-in-1 Card Reader (MS/MS PRO/SD/MMC/RSMMC) ExpressCard 43/54 slot
Connectivity	Realtek 802.11b/g WLAN Bluetooth V2.1 + EDR 2MP Digital Video Camera
Ports/Interfaces	3 USB 2.0 1 IEEE1394a 1 HDMI TV Tuner 1 eSATA 1 Headphone jack 1 Microphone jack 1 D-Sub 15 VGA 1 S/PDIF audio jack 1 RJ-45 jack for 10/100/1000Mbps Intel Boazman Ethernet 1 DC-in jack Kensington Lock Fingerprint Reader
Battery/Power	12-cell lithium-ion battery Full Range Auto-Switching 100V/240V AC Adapter

You'll have to jimmy the battery into the compartment and then lock it into place.



After the easy installation of a few components, our barebones notebook was ready to rock.

screws that came in the box, we attached each drive to a mount with four screws each. With the drives mounted, we lifted the notebook on its side to insert the drives. This way, gravity helped ensure the drives fit into the SATA slots correctly. We slid them into the two hard drive slots and secured them with a single screw each.

The battery installation is the last step. Whenever you're working with the internal parts of a computer, it's wise to have all power sources disconnected, and a notebook build is no exception. (As it turns out, as soon as the battery is locked into place, the fan kicks on—ever so gently—to dissipate what little heat there is.)

Inserting the battery was just a bit tricky; we had to sort of jimmy it into place and then push down to lock it in. If we tried to place it in the battery compartment at any particular angle, it wouldn't go.

There's a switch that unlocks the battery from its compartment after it's installed. Make sure this switch is in the lock position. Also note that the battery may have to charge for a while (up to four hours, according to OCZ) before you can use it. In the meantime, you can use the large power adapter that came with the kit.

Our battery already had some juice, though, and the notebook fired up as soon as we popped the battery into place. We got our Vista installation disc out, installed the OS, and started testing.

The Results

We were eager to see how our new machine would run, so we ran it through a few benchmarks. What pleased us the most was that throughout several tests, the area around the notebook vents never seemed to get too hot. Granted, the fan was going the whole time, but I expected a lot more hot air to blow out of the vents.

Our system scored an impressive P7180 in 3DMark Vantage with GPU and CPU scores of 6533 and 10211, respectively. It smoked Cinebench in 1:21 (min:sec), with a score of 10787. The audio was decent: We felt that sounds were spaced well, making it feel reminiscent of surround sound. But the volume itself, even when cranked to the max, wasn't enough to totally cover the fan noise.

For a do-it-yourself build, this kit was extremely easy to put together. We're used to working with many more components building desktops, which means making sure all the parts are compatible, installing all of them, and ensuring that all of the cables are connected. Slapping a few parts into a notebook engineered for easy access was a cinch.

After all is said and done, the time involved with researching which components to include in our whitebook, acquiring and installing the parts, and installing the operating system was a small price to pay for the privilege of customizing our own notebook.

Granted, the level of customization with a barebones notebook is nowhere near that of a desktop. However, the fact remains that we *did* get to put together a notebook according to our specifications, and we got to choose the parts that got us there. ▲

by Seth Colaner

The Costs

We used some top-notch (and therefore rather pricey) components in our DIY build. We checked the real-world prices on the whitebook, CPU, hard drives, and memory to see how much it would cost the average person to put together this exact system. (All prices are subject to change, but they were accurate as of press time.)

We found almost all the components at www.newegg.com. The barebones notebook itself was obviously the main cost; we found it available for $1,699.99. For $399, you can get the Intel X25-M SATA SSD, and the 320GB Western Digital Scorpio Black is a bargain at $89.99. The 4GB dual-channel OCZ PC3-10666 DDR3 kit was $109.99.

The Intel Core 2 Extreme QX9300 wasn't available at Newegg at press time, but we found it at AVADirect (www.avadirect.com) for $1,170.40.

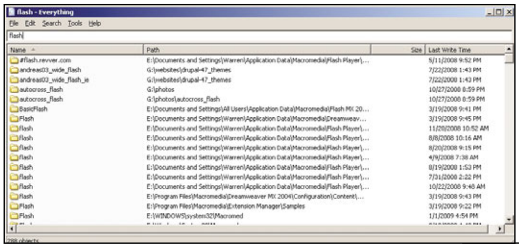
Total Cost: $3,469.37

You can spend a fraction of this amount on a barebones build if you go with a smaller notebook and less-powerful components. It just depends on what type of system you want. ▲

The Bleeding Edge Of Software

Inside The World Of Betas

Everything 1.2.0.323b



Name	Path	Size	Last Write Time
#flash.revver.com	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		5/11/2008 9:52 PM
andreas03_wide_flash	G:\websites\drupal-47_themes		7/22/2008 1:43 PM
andreas03_wide_flash_ie	G:\websites\drupal-47_themes		7/22/2008 1:43 PM
autocross_flash	G:\photos		10/27/2008 8:59 PM
autocross_flash	G:\photos\autocross_flash		10/27/2008 8:59 PM
BasicFlash	E:\Documents and Settings\All Users\Application Data\Macromedia\Flash MX 20...		3/19/2008 9:41 PM
Flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Dreamweav...		3/19/2008 9:45 PM
flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		11/20/2008 10:52 AM
flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		8/8/2008 10:16 AM
flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		8/20/2008 9:15 PM
flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		4/9/2008 7:38 AM
flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		8/19/2008 1:53 PM
flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		7/31/2008 2:22 PM
flash	E:\Documents and Settings\Warren\Application Data\Macromedia\Flash Player\...		10/22/2008 9:48 AM
flash	E:\Program Files\Macromedia\Dreamweaver MX 2004\Configuration\Content\...		3/19/2008 9:43 PM
Flash	E:\Program Files\Macromedia\Extension Manager\Samples		3/19/2008 9:22 PM
Flash	E:\WINDOWS\system32\Macromed		1/1/2009 4:54 PM

Everything 1.2.0.323b
Publisher and URL: Voidtools, www.voidtools.com
ETA: Q2 2009
Why You Should Care: There's never been a faster way to find files based on filenames.

Your software should be pretty darn good if you have the temerity to name your program "Everything," but after using Voidtool's Everything for a little while, we think the company's bravado is justified.

Everything falls somewhere in between Window's own Search tool and applications such as Google Desktop Search or Copernic Desktop Search. It only allows you to search for filenames and folder names, and not the contents of those files, so it's kind of like Windows Search. However, it uses a constantly updated index of your files to conduct the searching, so it's kind of like GDS. The neat part is that Everything is rocketship-fast—just start typing and it starts filtering results down instantly. There just isn't any waiting at all.

Amazingly, the index is incredibly small—just 2MB for a hard drive with 205,000 files, and Everything takes up just 14MB of RAM as it sits in the background, quietly monitoring your system for new files. The initial scan of our test system's files took just 15 seconds on a 1.8GHz notebook, too.

Everything just works on local NTFS partitions, but Everything has a few amazing network tricks. It has an internal HTTP server, so if you know the IP address of the computer you want to search for files on, just point your browser to it and do a network search, where the results appear almost instantly and provide hypertext links for downloads. Multiple instances of Everything on a LAN can talk to each other via ETP, or the Everything Transfer Protocol, which is based on FTP (which Everything can also handle).

Everything doesn't seem like a program that you'd absolutely have to have on your system at first, but if you look for files with the Windows Search function just once a week, its speed and simplicity more than make up for the tiny amount of RAM it consumes. ▲

by Warren Ernst

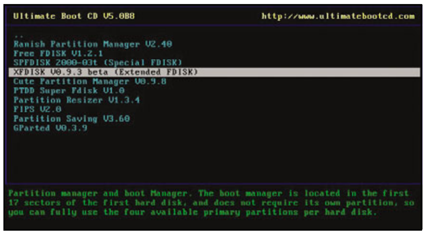
Ultimate Boot CD 5.0 beta 8

It's fair to say that the floppy drive is not as popular as it once was. Notebooks don't have options for internal floppy drives anymore, and when it's even available, the floppy is a rare option on the desktop. As such, the "emergency boot floppy disk" is something of an anachronism, though there's still a strong need to run various utilities outside of a Windows environment. Into the void left by the departure of 3.5-inch diskettes comes the Ultimate Boot CD, which combines close to 100 DOS-based and Linux-based utilities into a single bootable CD. Version 5.0 beta 8 adds a few neat twists to the old standby.

The most obvious change is a new GUI, where highlighting a program displays a description of it. This is especially helpful when faced with a menu filled with program names like "PCI" and "PCIScanner" right next to each other—there's no need to carry around a cheat sheet anymore.

More subtle changes abound. Almost all of the utilities have been updated to their most current versions, or at least their most current stable versions. Additionally, the menus have been slightly reorganized to make finding certain tools easier. Antivirus tools now have (at least more) up-to-date definitions.

The biggest change is the built-in Live-CD Linux Distro. It contains not only GParted and other Linux disk utilities but also auto-detects most networking environments and has Firefox, an FTP program, and other networking utilities. It can read and write NTFS partitions and Windows networking shares, making it ideal for data recovery when an installed copy of Windows just isn't cooperative any more.



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Ultimate Boot CD V5.0B8                                http://www.ultimatebootcd.com

 ..
 Ranish Partition Manager V2.40
 Free FDISK V1.2.1
 SPFDISK 2000-03t (Special FDISK)
 XFDISK V0.9.3 beta (Extended FDISK)
 Cute Partition Manager V0.9.8
 PTDD Super Fdisk V1.0
 Partition Resizer V1.3.4
 FIPS V2.0
 Partition Saving V3.60
 GParted V0.3.9

Partition manager and boot Manager. The boot manager is located in the first
17 sectors of the first hard disk, and does not require its own partition, so
you can fully use the four available primary partitions per hard disk.
```

The Ultimate Boot CD 5.0 beta 8
Publisher and URL: The UBCD Team, www.ultimatebootcd.com
ETA: Q2 2009
Why You Should Care: One boot disc to rule them all.

The only flaw we found in the beta is that an information screen doesn't appear when the disc is inserted into a drive while running Windows. Otherwise, we find the beta's built-in Linux distro a compelling reason to replace any older version of the UBCD you may have in your toolkit. ▲

by Warren Ernst

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UP TO SPEED

Upgrades That'll Keep You Humming Along

DivX, FileZilla, and a new Google Chrome lead the updates this month. Oh, and then there's that little thing called the Windows 7 beta.

Software Updates

AVS Video Converter 6.2.3.314

The video format converter and DVD burner/ripper adds support for multithreading, HD video, Blu-ray Discs, and subtitles. The interface has been upgraded, as well.

www.avs4you.com/AVS-Video-converter.aspx

The Bat Professional 4.1.9

The cult fave email client for every variety of account now allows use of Common quick templates for mass mailings and auto-disconnect on dial-up. It fixes DEP detection under Windows Server 2008 and deletes old format index files after the conversion to the new format. There are similar fixes to the Bat Home and Voyager versions.

www.ritlabs.com

CachemanXP

The caching tool for improving system performance now supports Intel Core i7 CPUs and new hotkeys have been added. The Auto-Optimize function is improved on 64-bit versions of Windows 2003 and XP.

www.outertech.com

DivX 7

The latest version of the video player offers HD H264 video playback on a PC and in a browser. The pro versions will convert various formats to DivX in one step, and the new DivX Pro Codec allows you to create and play DivX videos in third-party software.

www.divx.com

FileZilla 3.2.0

In the final stages of this version release of the FTP client, an account logon bug was fixed. Recent changes include support for another directory listing variant on MVS style systems, not showing proxy password in the message log on SFTP connections, and changed wording in some strings.

filezilla-project.org

FreeBSD 7.1

This free OS alternative addresses recent security flaws and makes multiple changes to the kernel. The AGP driver now supports Intel G33 and G45. The DRM kernel supports i915 GME devices. Networking support has been improved for a range of hardware and configurations.

freebsd.org

Free Download Manager 3

Now with file management in Safari and Chrome, this file download tool lets you set priorities within a torrent and exclude files. You can share data with others on P2P networks and automate the virus checking of downloads.

www.freedownloadmanager.com

Google Chrome 2.0.156.1 Beta

The early January refresh of the next Chrome release sports a new version of WebKit, and adds form autocomplete and full page zooming. The update also in-cludes Google Bookmark importing, more efficient SafeBrowsing, autoscrolling, and new multi-window layouts.

www.google.com/chrome

LimeWire Beta 5.0.4

This file-sharing client now shows your firewall status, and the collection sharing feature has been enhanced to share files as you add them. Version 5 also boasts an upgraded interface and a new Friends feature for sharing files among your contacts.

www.limewire.com

Orca 1.1 RC2

The Firefox-based browser from the folks who made Avant Browser fixes a DDE bug and unresponsive tab switching. Nonworking navigation buttons in Flash are repaired, as is a file downloading problem.

www.orcabrowser.com

Picasa 3.1

Google's image manager/editor refreshes its recently released version 3. Google is not specifying the fixes and additions to this build, but Picasa 3 is a major upgrade that allows for the storage of millions of photos, collage creation, better tagging, and screen saver creation.

picasa.google.com

Windows 7 Beta

Experienced users may want to try the public beta release of Microsoft's next-gen operating system, which promises better performance than Vista, easier device management, and a more efficient interface. Jump Lists keep frequently accessed files at hand and provide more intuitive task manipulation. The beta can be burned to a bootable ISO DVD-ROM for installation.

www.microsoft.com/windows/windows7

Driver Bay

Intel Graphics Media Accelerator 14.37.0.5009

The drivers now support 512MB system memory for many desktop and mobile Express chipsets. You can now read the color depth from the driver panel.

www.intel.com

GeForce Release 181

The Nvidia video card drivers now support GTX 295/286 parts. This version enables SLI on X56 motherboards and adds SLI support for multi-monitors. PhysX acceleration is enabled so you can run PhysX from one card and use a different one for graphics.

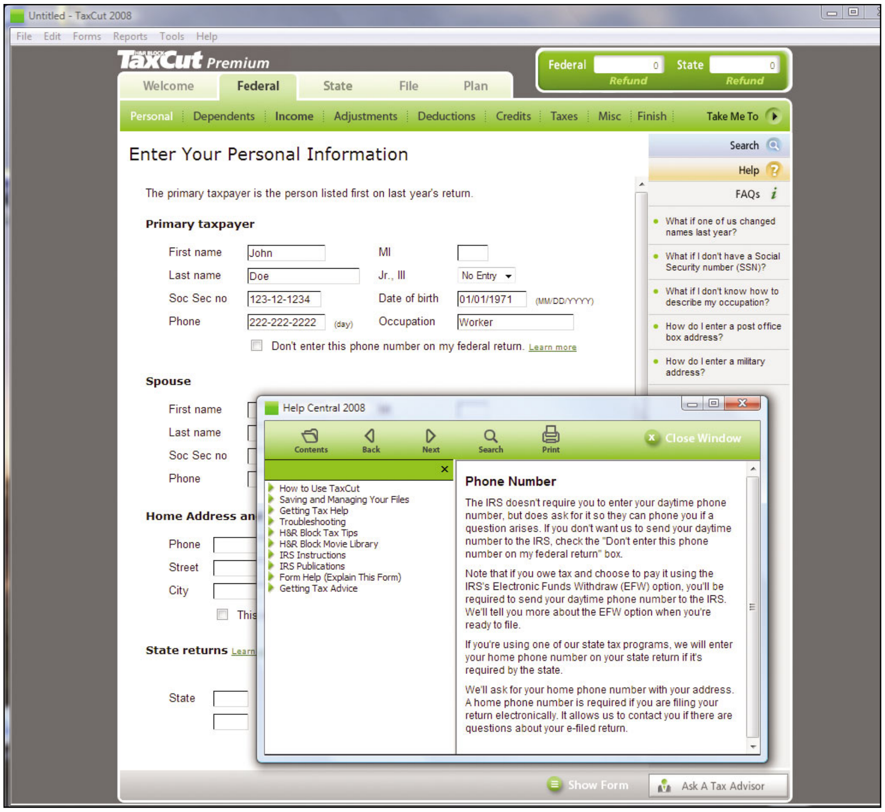
www.nvidia.com

Procrastinator's Guide To Tax Software

Three Programs That Will Help You Maintain Your Sanity & Keep The IRS At Bay

This is the time of year where all Americans get a taste of what we magazine writers live with constantly: a flurry of research and phone calls, lots of fact-checking, and perhaps some midnight oil burned to make a deadline. The big difference is that in your case, missing that deadline means facing the ire of the IRS and maybe even paying a stiff penalty.

While some people can fill out a 1040EZ while watching "Lost", and others can drop a stack of papers on the desk of their CPA and forget about it, most of us are sentenced to the purgatory of having to submit a full 1040 and all of its attendant paperwork. Although it is still possible to do this the old-fashioned way—filling in paper forms by hand and mailing them to the IRS—do yourself a huge favor and let your computer take care of most of the work by using a tax software package. It's faster and lets you avoid handwriting mistakes. If you e-file, you'll get your tax return in as little as eight days. We looked at three of the most popular programs to compare their features and ease-of-use.



Enter Your Personal Information

The primary taxpayer is the person listed first on last year's return.

Primary taxpayer

First name: John
MI:
Last name: Doe
Jr., III: No Entry
Soc Sec no: 123-12-1234
Date of birth: 01/01/1971 (MM/DD/YYYY)
Phone: 222-222-2222 (day)
Occupation: Worker
☐ Don't enter this phone number on my federal return. Learn more

Spouse

First name
Last name
Soc Sec no
Phone

Home Address an

Phone
Street
City
☐ This

State returns Learn

State

- What if one of us changed names last year?
- What if I don't have a Social Security number (SSN)?
- What if I don't know how to describe my occupation?
- How do I enter a post office box address?
- How do I enter a military address?

- How to Use TaxCut
- Saving and Managing Your Files
- Getting Tax Help
- Troubleshooting
- H&R Block Tax Tips
- H&R Block Movie Library
- IRS Instructions
- IRS Publications
- Form Help (Explain This Form)
- Getting Tax Advice

Phone Number

The IRS doesn't require you to enter your daytime phone number, but does ask for it so they can phone you if a question arises. If you don't want us to send your daytime number to the IRS, check the "Don't enter this phone number on my federal return" box.

Note that if you owe tax and choose to pay it using the IRS's Electronic Funds Withdraw (EFW) option, you'll be required to send your daytime phone number to the IRS. We'll tell you more about the EFW option when you're ready to file.

If you're using one of our state tax programs, we will enter your home phone number on your state return if it's required by the state.

We'll ask for your home phone number with your address. A home phone number is required if you are filing your return electronically. It allows us to contact you if there are questions about your e-filed return.

H&R Block TaxCut
$19.95 Basic, $34.95 Premium Federal + E-File, $49.95 Premium Federal + State + E-File, $79.95 Home & Business + E-File
www.hrblock.com
●●●●

H&R Block TaxCut

The strength of H&R Block TaxCut has always been that, for most people, a local H&R Block office is available to provide help along the way if you run into trouble, and this year's product is no exception. It costs extra, especially if you have a lot of questions, but if you're a tax newbie, it's comforting to have that Ask A Tax Advisor panic button at the bottom of the screen. Activating this feature sets you back $19.99 per topic discussed, so be sure to get the Premium or Home & Business edition if you plan to use this feature.

TaxCut's interface does a good job of whisking you through the Q&A, and many times when a lot of potentially confusing options are involved, a Guide Me button appears. When clicked, it branches off into detailed questions that let you choose the option that best matches your situation. Better still, a number of context-sensitive

FAQs appear in a pane on the right-hand side of the screen that are almost always useful and really help cut down on the time spent having to dig through a Help file. If there's ever a weird option on a form, the software often places a Learn More or Special Instructions link next to it so you can see why the option is there. For example, during the federal Q&A, you can check a box to not enter your phone number on the return, and clicking Learn More gives detailed information about the ramifications of checking the box.

E-File Info

In the past, verifying your identity to the IRS was as simple as signing a form, but this year things have changed. Now you'll need to supply the exact AGI (Adjusted Gross Income) reported on your return from last year or use the e-file PIN (Personal Identification Number) you used last year. If you plan to e-file, be sure to have one of those two things available long before the filing deadline so you can avoid a last-minute panic attack. If you can't find any of that information, you can call the IRS toll-free at (800) 829-1040 to get help tracking down what you need.

Also note that if you have an adjusted gross income of $56,000 or less and meet certain age requirements (variable by service and state), then you are eligible to use an online tax preparer that participates in the IRS Free File Alliance program. Unfortunately, the IRS doesn't impose any standards as to what forms these companies must support to be eligible for the program, so there's a chance that if you run into an unforeseen complication during the preparation process you'll have to start over with software that handles all the forms you need. The IRS maintains a complete list of Free File Alliance companies at www.irs.gov, and you can access it by clicking the FreeFile graphic on the left hand side of the IRS home page. ▲

Occasionally during the process, a link appears that lets you play a movie about the current section, including one with a helpful summary of 2008 tax law changes. Data can be imported from Money, Quicken, or any other program that supports the TXF format. One nice thing is that when TaxCut presents options, such as other forms of income, the list is fairly comprehensive (jury duty pay was included, for example), and it's all presented on the same page so you're less likely to overlook something. In fact, TaxCut did a better job than its rivals of keeping related information on the same page so we could fill everything out at once instead of having it broken into a number of smaller segments scattered throughout a number of separate pages.

The version reviewed comes with WillPower, an estate planning tool, and DeductionPro 2008, a separate module that does a thorough job of tracking down deductions and helping you claim the maximum amount for them. One annoyance encountered with DeductionPro is that it changed our Windows Vista color scheme from Aero to Basic every time it launched. It's a known issue, and a fix is promised but wasn't available during our evaluation. The main program also handles deductions well, placing What Qualifies links next to each category so you can quickly determine eligibility.

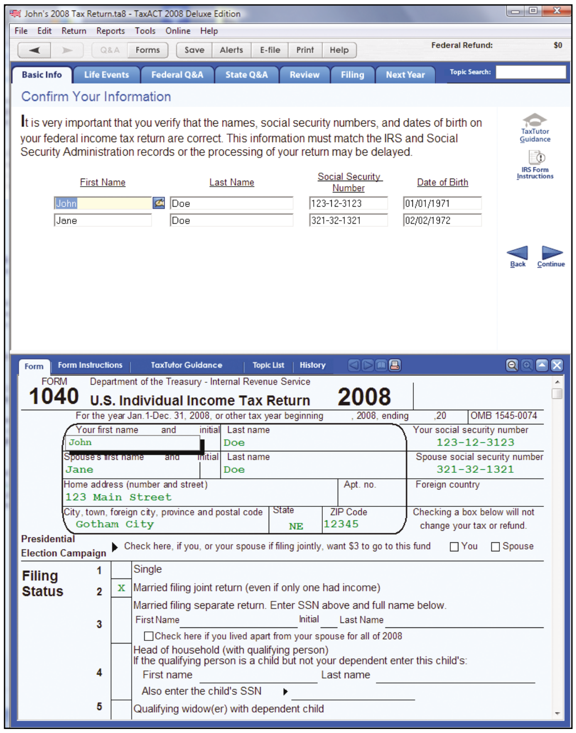
A concise summary appears at the end of every major section with Go To links for navigating directly to that portion of the Q&A for corrections if necessary. Each entry in the summary also has an Explain Amount link that does a good job of telling you why you may or may not have qualified for a particular credit or deduction.

The software automatically checks for errors and verifies data and did a good job of catching and explaining problems we'd intentionally introduced into the return. You can also generate three reports at the end of the interview. One breaks down how the software reduced your tax bill, another compares your deductions to U.S. averages, and the third one is a Block Advantage report that provides tax-saving tips based on the data entered on your forms.

TaxAct

TaxAct is by far the least expensive of the products we tested—in fact, a free edition is available and is perfectly adequate for those who have a straightforward return and don't need much hand-holding.

TaxAct's interface is split into two halves that make it easy to fill in forms. The top half is where you answer questions and fill in information, and has tabs that let you easily navigate to any portion of the Q&A so you can review and modify answers. The bottom half of the screen has tabs showing a facsimile of the form


John's 2008 Tax Return.ta8 - TaxACT 2008 Deluxe Edition
File Edit Return Reports Tools Online Help
Q&A Forms Save Alerts E-file Print Help
Federal Refund: $0
Basic Info Life Events Federal Q&A State Q&A Review Filing Next Year
Topic Search:
TaxTutor Guidance
IRS Form Instructions
Back Continue
Form Form Instructions TaxTutor Guidance Topic List History

Confirm Your Information

It is very important that you verify that the names, social security numbers, and dates of birth on your federal income tax return are correct. This information must match the IRS and Social Security Administration records or the processing of your return may be delayed.

First Name	Last Name	Social Security Number	Date of Birth
John	Doe	123-12-3123	01/01/1971
Jane	Doe	321-32-1321	02/02/1972

FORM 1040 Department of the Treasury - Internal Revenue Service
U.S. Individual Income Tax Return 2008
For the year Jan.1-Dec. 31, 2008, or other tax year beginning , 2008, ending ,20 OMB 1545-0074

Your first name and initial: John
Last name: Doe
Your social security number: 123-12-3123
Spouse's first name and initial: Jane
Last name: Doe
Spouse social security number: 321-32-1321
Home address (number and street): 123 Main Street
Apt. no.
Foreign country
City, town, foreign city, province and postal code: Gotham City
State: NE
ZIP Code: 12345
Checking a box below will not change your tax or refund.

Presidential Election Campaign ▶ Check here, if you, or your spouse if filing jointly, want $3 to go to this fund ☐ You ☐ Spouse

Filing Status
1 ☐ Single
2 ☒ Married filing joint return (even if only one had income)
3 ☐ Married filing separate return. Enter SSN above and full name below.
First Name ______ Initial ___ Last Name ______
☐ Check here if you lived apart from your spouse for all of 2008
4 ☐ Head of household (with qualifying person)
If the qualifying person is a child but not your dependent enter this child's:
First name ______ Last name ______
Also enter the child's SSN ▶ ______
5 ☐ Qualifying widow(er) with dependent child

TaxAct
$12.95 Deluxe, $19.95 Ultimate (includes state return),
$13.95 for state return in Deluxe
www.taxact.com
●●●◖

Online Options

As long as you have a decent Internet connection, you don't even have to download a client or purchase a physical copy of tax software for preparation and filing. Instead, you can check out one of the many online services offered by the top companies and work on your taxes from any computer that has a Web browser. Best of all, the services we tested don't even charge money or ask for credit card details until you are ready to file, so you can feel free to test drive all of them to find a perfect match for your needs.

TaxAct Online

TaxAct is marketed as an online program (the client download link is buried at the bottom of the company's Web page), and its online implementation is great. Video help is available to walk you through key areas of the site, and although a view of the form you're working on isn't available at the bottom of the window, as in the desktop program, there is a link on every page that displays the IRS form instructions for the current section. A Help Center option pops up documentation in its own window so you don't have to navigate away from the Web site.

All of the Life Events that are so helpful in the standalone version are also available in the online version, and the Federal Q&A session is very similar. It's easy to work through and caught errors in a W-2 we entered. It also includes sections for people who own a business or have real estate income and provides nice summaries at the end of every major section of the Q&A. A Preview 1040 button also appears before filing that lets you scan a PDF version of the 1040 the program will generate so you can spot-check it for errors. Problems you may have missed are automatically scanned for at the end of the process, and then you can either e-file or print your return.

TaxAct Online
$9.95 for Deluxe or $16.95 for Ultimate (Deluxe plus State)
●●●●

H&R Block's TaxCut Online

This Web-based filing system has a slick interface and does a good job of both catching mistakes and letting users fix them without having to re-enter a lot of data. Deductions are handled well, and credits you qualify for are checked based on information already provided (it's possible to check others manually if necessary). A summary appears at the end of every completed section showing totals for every category in that section along with links that make it easy to go back and make corrections.

TaxCut Online automatically checks for errors as the forms are filled out, provides a summary of your overall tax situation for 2008, and transfers all of the information from your federal return to your state return. It costs $29.95 to file a state return using the service, but this can be skipped if you would rather file manually.

The hook with TaxCut Online, and the reason it seems to cost a lot more than competing options, is that several of the service tiers come with tax advice from a real person. All paid editions provide support from a local H&R Block representative if you are audited. The Premium edition lets you ask one question via phone or email to an H&R Block Tax Advisor, and Signature grants access to unlimited advice, as well as a professional review of your return before it is submitted. Online Office is full-service: H&R Block prepares your taxes and provides unlimited tax advice year-round, but the price can balloon as high as $629.25 if you have a very complicated return.

H&R Block's TaxCut Online
$14.95 Basic, $39.95 Premium, $79.95 Signature, $99.95 and up for Online Office (state returns cost an extra $29.95 regardless of the service tier)
●●●●

TurboTax Online

We looked at the Deluxe version, which has an interface comparable to that of the standalone version and provides access to the same Live Community features. As with the desktop software, we liked the Audit Risk Summary scan. Overall there's not much to say about TurboTax Online that we haven't already said about the standalone version. They really are that similar, and TurboTax Online comes highly recommended if you want a full-featured tax preparation application.

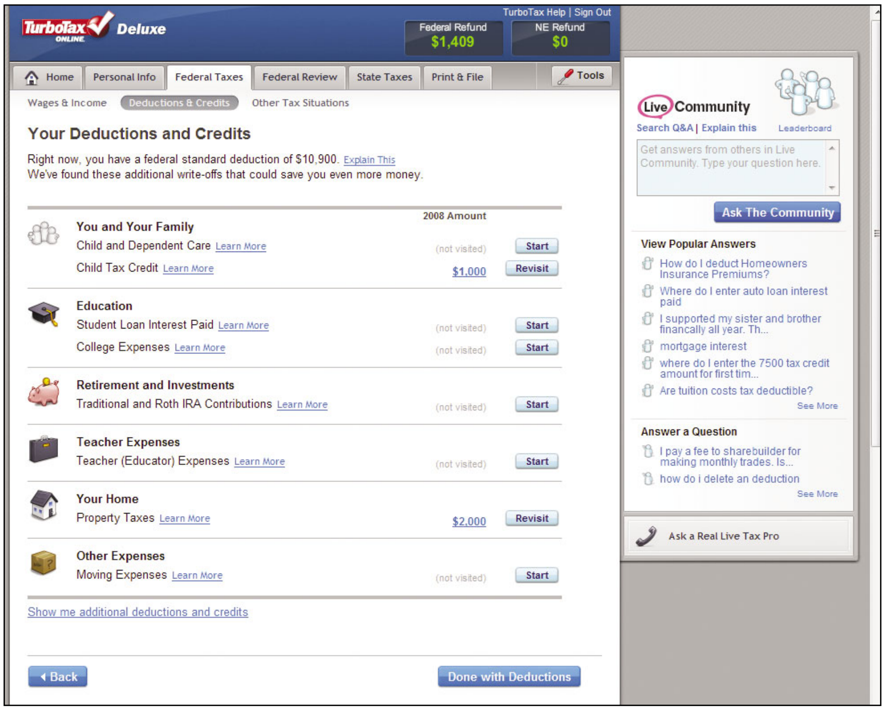
TurboTax Online
$29.95 Deluxe, $49.95 Premier, $74.95 Home & Business, $109.95 Business, $29.95 per state return
●●●●●

being worked on, instructions for what is currently displayed in the top half, TaxTutor Guidance and a Topic List for learning more about what you're working on, and a History tab showing your progress. Having relevant form instructions visible at all times is very helpful, and you can resize the top or bottom box to better display what is being worked on at any given moment.

The guided Q&A is terrific. It branches into topics that are relevant to your situation based on past answers and makes it easy to skip topics that don't apply. If you've sold stocks throughout the year, TaxAct has partnered with GainsKeeper.com and can pull that data from your brokerage accounts so you don't have to enter it yourself. This year's edition also comes with a Donation Assistant that contains fair market prices for approximately 700 items.

TaxAct's streamlined workflow will let most users who know what they're doing complete their taxes very quickly, and it did a good job of finding minor errors in our test return and letting us easily fix the problems. It might not have all the bells and whistles of the other programs, but it's easy to use and

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT



Your Deductions and Credits

Right now, you have a federal standard deduction of $10,900. Explain This
We've found these additional write-offs that could save you even more money.

	2008 Amount	
You and Your Family		
Child and Dependent Care Learn More	(not visited)	Start
Child Tax Credit Learn More	$1,000	Revisit
Education		
Student Loan Interest Paid Learn More	(not visited)	Start
College Expenses Learn More	(not visited)	Start
Retirement and Investments		
Traditional and Roth IRA Contributions Learn More	(not visited)	Start
Teacher Expenses		
Teacher (Educator) Expenses Learn More	(not visited)	Start
Your Home		
Property Taxes Learn More	$2,000	Revisit
Other Expenses		
Moving Expenses Learn More	(not visited)	Start

Get answers from others in Live Community. Type your question here.

View Popular Answers
- How do I deduct Homeowners Insurance Premiums?
- Where do I enter auto loan interest paid
- I supported my sister and brother financally all year. Th...
- mortgage interest
- where do I enter the 7500 tax credit amount for first tim...
- Are tuition costs tax deductible?

Answer a Question
- I pay a fee to sharebuilder for making monthly trades. Is...
- how do i delete an deduction

TurboTax 2008
$29.95 Basic (federal), $59.95 Deluxe (federal & state), $89.95 Premier (federal & state), $99.95 Home & Business (federal & state)
turbotax.intuit.com
● ● ● ●

relatively inexpensive—especially if you're filing a state return electronically.

TurboTax 2008

The latest version of TurboTax incrementally improves on past editions, but that's OK because it's still arguably the best tax prep software available. You can port much of the information from last year's TurboTax return into this one to cut down on typing, and when that's done, TurboTax presents a handy Tell Us About 2008 page with checkboxes for a number of events that may have impacted your taxes.

The Live Community is a terrific feature that lets you easily ask questions of other TurboTax users directly from the program. The Q&A interface for this feature is always displayed as a sidebar while you work, making it easy to fire off a quick question and monitor for answers or just to access questions that have already been asked and answered. The downside is that you're talking to other users who aren't necessarily qualified tax professionals, so you'll still have to research any answers you receive to verify their accuracy, but this service is invaluable to power users who know what a boon message boards can be for troubleshooting. We also noticed that most questions are answered within an hour or less, and that figure should actually improve as the filing deadline approaches and an increasing number of users are working with the software. If you really need expert help, you can email a question to a tax professional affiliated with TurboTax, and they will call you within an hour and discuss the topic for a $29.95 fee.

If your employer's payroll provider is partnered with TurboTax, you can import your W-2 directly into the software, and you can also import paycheck data from Quicken or any financial planning package that supports TXF files.

One of the best features of the software is that it often lets you speed through sections of the forms that you know a lot about but also provides a much more detailed breakdown of the section if you aren't familiar with it. For example, in the section for entering different types of income, if you know what you're doing, you can go directly to specific topics to choose what type of income you earned, or if you aren't sure, you can opt for a guided tour that takes you through all of the available types of income.

The software handles deductions by letting users select a money range in a variety of categories such as home mortgage interest and real estate taxes. Based on that, it will tell you whether you'll qualify for more deductions through itemizing or taking the standard deduction. When itemizing, the software provides two options of selecting specific deductions if you know what you qualify for or walks you through the complete list of 350 possible deductions and credits and selecting those that apply.

The program's interface is fantastic and lets users choose among a Step-by-Step guided mode, a Forms Mode that displays facsimiles of the forms being worked on, and a Split View that combines the two modes (much like TaxAct). TurboTax does a good job of scanning for errors and letting you correct them and is the only program we tested that caters to tax pros and novices.

The Bottom Line For Your Bottom Line

Comparing the three packages, it's difficult to decide which is better: TurboTax with its excellent interface and integrated Live Community feature or TaxCut with its abundant context-sensitive help and terrific summaries. Live Community gives TurboTax a slight edge over TaxCut, but we recommend trying the online versions of both (see sidebar) to see which one is most appealing before buying a boxed copy.

TaxAct is recommended for those experienced in doing their taxes who want to do so with the least amount of fuss, and you may want to use it to file a state return even if another package is used to prepare your federal return, just to save some cash.

Whichever tax program you decide to use, bear in mind that if you itemize your deductions, you can write off last year's tax preparation costs. This includes the price of tax software, so hang on to your receipts for use next year, as every little bit helps. ▲

by Tracy Baker

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AMD Phenom™ X4 Quad-Core Processor

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9850+ CPU	$ 609
9750+ CPU	$ 595
9650+ CPU	$ 575

AMD Athlon™ X2 Dual-Core Processor

7750+ CPU	$ 515
7550+ CPU	$ 499

From $499

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RapidSolution Software AudialsOne

In late 2008, RapidSolution Software released the third version of AudialsOne, which combines the RadioTracker, MP3-VideoRaptor, and TuneBite programs. AudialsOne is one of the few programs that offers people a legal and relatively inexpensive way to obtain massive amounts of music and videos from the Internet.

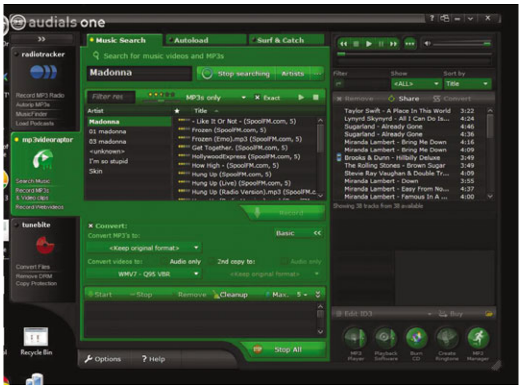
RadioTracker lets you stream Internet radio from several genres and then record songs from the radio. RadioTracker and MP3VideoRaptor both have a tab called MusicFinder, where you can list songs you would like to download. If a station you have selected plays one of these songs, it will be automatically ripped. Additionally, RadioTracker's Taste In Music feature will find stations based on the songs you have listed in MusicFinder. If you find a song via MP3VideoRaptor that you have listed on your "Wish List" in MusicFinder, and you download it in RadioTracker, it's accounted for in both areas.

With MP3VideoRaptor, you can search for MP3s and videos for particular artists and songs, but like any Internet download, the quality of these MP3s and videos is hit and miss.

Finally, TuneBite will unprotect DRM-protected music and movies so you can use those mediums universally. TuneBite will search through your music collection and find all DRM-protected music and convert it all in one big batch if you'd like. You can also convert music into ringtones.

The software has a little bit of a learning curve. Once you get the hang of it, however, it's pretty easy to use. The best part of AudialsOne is all the helpful features it includes. For example, Audials-One will search your music collection, and if you have, say, 10 out of 13 tracks of an album downloaded, AudialsOne will find and download the other three so you have the full album. ▲

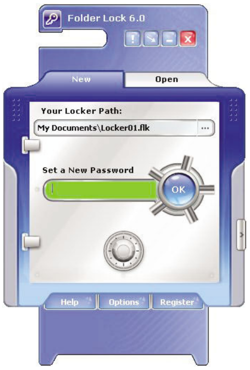
by Tessa Warner Breneman



RapidSolution Software AudialsOne
$59.90
www.audials.com
●●●

NewSoftwares Folder Lock 6.1.3

Almost all of us have documents on our PCs that we need to keep under tight wraps. Whether it's financial information, medical documentation, or files sensitive to your company, a lot of us need to take an extra step to ensure privacy. NewSoftwares Folder Lock 6.1.3 is a program that lets you add a layer of security to your computer to keep your confidential information under lockdown.



Folder Lock 6.1.3 touts 256-bit AES encryption, and in addition to being able to download it to your desktop, you can download it to a portable device, such as a flash drive. To boost its portability, Folder Lock also lets you email lockers (what they call the Folder Lock folders) or upload them to a computer. Of course, the computer that you move it to must either have the program installed, or you must have the program on a flash drive, which defeats the purpose if you are emailing it to yourself. If you are emailing it to someone else, however, just be sure you both have the Folder Lock downloaded. Also, in order to uninstall the program or delete the locker, you must be logged in.

If you share a PC with roommates or others in your house, you can put Folder Lock on Stealth Mode to cover any tracks of the program even being installed on the computer. The options in Stealth Mode include the ability to hide the program from the Desktop and start menu, the add/remove programs, the context menu in Internet Explorer, and the program files or installation location. Then, you can select a set of hot keys to run Folder Lock.

To ensure your housemates aren't trying to break into your folders, you can set the preferences to lock the whole PC or shut it down if there have been five failed attempts to log in to the locker. It also logs the number of failed attempts, along with the date and time of the attempted break-in, and which locker the culprit was trying to hack.

Other security features include history cleaning and automatic protection. When you close a program in your locker, the history cleaning feature erases it from places such as the recent document history, the find files and folders history, the clipboard, and others. Automatic protection, then, will close your locker if your PC is idle for an amount of time determined by the user.

The interface was simple and easy to use, and I didn't run into any software glitches. It's also important to note that if you have to reinstall Windows, your files will remain locked and intact. ▲

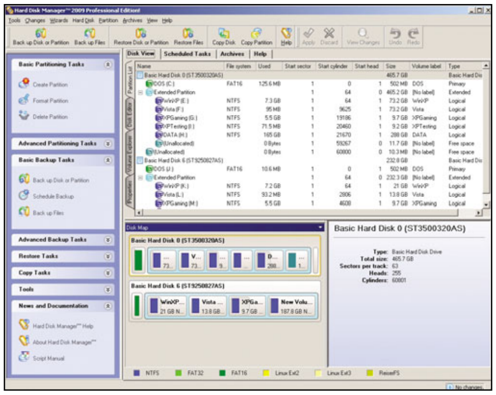
by Tessa Warner Breneman

NewSoftwares Folder Lock 6.1.3
$39.95
www.newsoftwares.com
●●●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Hard Disk Manager Professional 2009

Paragon's Hard Disk Manager Professional 2009 isn't for everyone, but if you're a part of its target audience, you simply won't find a better hard disk partition manager, cloning tool, backup program, rescue disc, and disk-wiper all in one. However, in a world with numerous free tools able to perform most of what HDMP does almost as well and elegantly as HDMP, is it worth spending $129 for the privilege? If you set up and fix computers for a living, the answer is an unqualified "yes," but if you're an advanced hobbyist (a *CPU* reader), then the answer is a little murky.



Name	File system	Used	Start sector	Start cylinder	Start head	Size	Volume label	Type
Basic Hard Disk 0 (ST3500320AS)						465.7 GB		Basic Hard Dis
DOS (C:)	FAT16	125.6 MB	1	0	1	502 MB	DOS	Primary
Extended Partition			1	64	0	465.2 GB	[No label]	Extended
WinXP (E:)	NTFS	7.3 GB	1	64	1	73.2 GB	WinXP	Logical
Vista (F:)	NTFS	95 MB	1	9625	1	73.2 GB	Vista	Logical
XPGaming (G:)	NTFS	5.5 GB	1	19186	1	9.7 GB	XPGaming	Logical
XPTesting (I:)	NTFS	71.5 MB	1	20460	1	9.2 GB	XPTesting	Logical
DATA (H:)	NTFS	165 GB	1	21670	1	288 GB	DATA	Logical
(Unallocated)		0 Bytes	1	59267	0	11.7 GB	[No label]	Free space
(Unallocated)		0 Bytes	1	60800	0	10.3 MB	[No label]	Free space
Basic Hard Disk 6 (ST9250827AS)						232.8 GB		Basic Hard Dis
DOS (J:)	FAT16	10.6 MB	1	0	1	502 MB	DOS	Primary
Extended Partition			1	64	0	232.3 GB	[No label]	Extended
WinXP (K:)	NTFS	7.2 GB	1	64	1	21 GB	WinXP	Logical
Vista (L:)	NTFS	93.2 MB	1	2806	1	13.8 GB	Vista	Logical
XPGaming (M:)	NTFS	5.5 GB	1	4608	1	9.7 GB	XPGaming	Logical

Basic Hard Disk 0 (ST3500320AS)
Type: Basic Hard Disk Drive
Total size: 465.7 GB
Sectors per track: 63
Heads: 255
Cylinders: 60801

Basic Hard Disk 6 (ST9250827AS)
WinXP... 21 GB N...
Vista ... 13.8 GB...
XPGa... 9.7 GB ...
New Volu... 187.8 GB N...

HDMP combines a lot of tools, yet they all share a similar interface and are logically grouped by the simple launching app. Much like the beloved-but-old Norton Ghost 2003, HDMP can back up and restore drives and partitions (along with Track-0 data like the MBR) to other drives, optical media (including BDs and DVDs), a special "hidden" partition on the drive (called a "Capsule"; think "hidden restore partition" à la Dell), and network shares. Unlike Ghost, HDMP does so from within Windows itself, making the process much faster (at least two times faster in our tests) and more intuitive. Also, unlike Ghost, you can make incremental image backups, file-level (as opposed to sector-level) backups, scheduled backups, and even transfer a Vista partition to a new computer sans drivers. A built-in scripting language can automate repetitive tasks.

Restoring a Windows boot partition requires using HDMP's "rescue discs," but you can create either a Linux-based or Windows Vista PE-based CD or bootable flash drive for the ultimate in flexibility and hardware compatibility. The Windows Vista PE disc, in particular, is extremely useful because it contains all of HDMP's utilities and the standard HDMP launcher, making it more of a general-disk-utility-disc than a mere rescue disc. We couldn't locate a system where at least one of the discs wouldn't work.

The partition manager is rather like GParted on steroids, offering many advanced options simply unavailable from freeware tools, yet maintaining a slick interface that invites investigation. A hard-drive transferring tool makes upgrading to a hard drive a snap, and the disk-wiper uses the U.S. DoD 5220.22-M spec; all work well. Though its advertising touts HDMP as a great tool for preparing a hard drive for multiple operating systems, there's no built-in boot manager to actually pull this feat off.

Should you perform these tasks regularly, then HDMP is supremely useful and worth the price of admission. If you perform them less than, say, twice a year, stick with the freebies. ▲

by Warren Ernst

Hard Disk Manager Professional 2009
$129
www.paragon-software.com/home/hdm-professional
● ● ● ● ◖

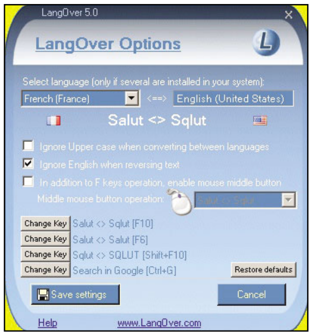
LangOver 5.0

If you have to work with multiple languages in Windows, then you're undoubtedly familiar with the alternative keyboard layouts that are available. For example, the French keyboard has the letter *Q* where the *A* is on the U.S. English keyboard, and the UK English keyboard has most of its punctuation marks on different shifted keys than what you'd expect as an American. Switching keyboard layouts is not terribly difficult, but it is easy to forget and can result in lots of strange typos. For these admittedly unusual situations, there's LangOver, which can swap characters back and perform a few other neat text tricks.

Using LangOver is simple. Just highlight some text in your word processor or text field and press the F10 key, or optionally click the middle mouse button. Instantly, LangOver transcribes all the characters from one of your keyboard layouts into the other, transforming "Salut" into "Sqlut" and vice versa, provided your two layouts are U.S. English and French. Use the Windows Control Panel to set up your keyboard languages.

Other options include the F6 key, which swaps characters in a selected work, transforming ABC to CBA, which is useful when swapping from a left-to-right to a right-to-left language. Pressing CTRL-G performs a Google Search on the selected word. You can also change the hotkeys to avoid software conflicts.

All this functionality can be yours for merely $85. Just kidding; this is a free software package, but donations are appreciated by its author. We find it does exactly what it advertises without any measurable system slowdown. ▲



Select language (only if several are installed in your system):
French (France) <==> English (United States)
Salut <> Sqlut
☐ Ignore Upper case when converting between languages
☑ Ignore English when reversing text
☐ In addition to F keys operation, enable mouse middle button
Middle mouse button operation: Salut <> Sqlut
Salut <> Sqlut [F10]
Salut <> Salut [F6]
Sqlut <> SQLUT [Shift+F10]
Search in Google [Ctrl+G]

by Warren Ernst

LangOver 5.0.10
Free
www.langover.com
● ● ● ◖

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

Dialogue Box

by Chris Pirillo

High Definition Without A High Price

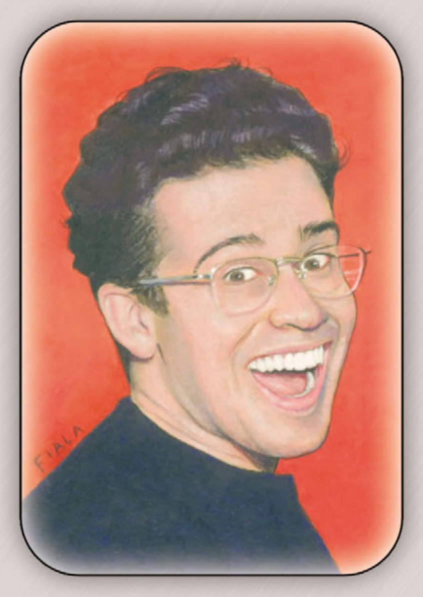
I'm guessing that at some point today, you either created or viewed some kind of video online, be it on YouTube or somewhere else. Perhaps that creation was recorded in high definition—1,280 x 720, by today's standards. Maybe you wondered, aloud or to yourself, "Gee, I'd like to record my own HD videos, but those cameras are so expensive. And the software is tricky to use."

Wonder no more! At my disposal, I have the Flip Mino HD ($229.90; www.theflip.com), the Kodak Zi6 ($179.95; www.kodak.com), and the Creative Vado HD ($229.99; us.creative.com). Each one of these devices is capable of recording at a grand resolution of 1,280 x 720, and they should each be roughly $200. That's where their similarities end.

The low-cost video camera brand juggernaut from Pure Digital, commonly known as "The Flip," comes in a variety of flavors. I had been overly impressed with the Flip Ultra and couldn't wait to get my hands on the Flip Mino HD. A sleek form factor, lightweight shell, and built-in cross-platform software is what pulled me in. But those features weren't enough to keep me from all but abandoning the Flip Mino HD.

Yes, the Flip does record video in low-light situations, but whereas the original Flip Ultra/Mino produced undersaturated frames, the Flip Mino HD produced an insane amount of noise, fuzziness, and (still) undersaturated frames. The automatic white balance would consistently produce warmer tones (read: everything looks yellow indoors), which was more than bothersome. Moreover, precision was next to impossible. I would find myself pressing Left/Right/Delete/Play a few times, often accidentally brushing them and initiating an action I didn't intend. The tiny LCD didn't bother me too much, but just about everything else did.

I had higher hopes for the Kodak Zi6, and my initial impressions were overwhelmingly positive. It costs less, enables recording to an SDHC card, runs on two AA batteries, and has a gigantic LCD screen and a convenient macro lens toggle. Video quality seemed to be closer to perfect, and the audio was far richer than what I had ever experienced with any Flip video camera. Then, I noticed something that I perceived as a gigantic oversight in quality control. To retain exposure in low-light situations, the Kodak essentially "blurs" the video, causing unpredictable ghosting in an underexposed scene. I couldn't accept that, nor could I abide by the wrist strap being placed directly next to the tripod mount. Someone was asleep at the engineering wheel there.



I then discovered that Creative was working on an update for the Vado, an HD video recorder with a swappable/rechargeable battery, flexible USB arm, two hours of high-definition video capacity, and—get this—a wide-angle lens. I tore open the package when it finally arrived, immediately set the Vado on a tripod, and gave it a quick test in my home office with lots of color, lots of motion, and ample indoor light. The results, out of the box, were spectacular. The image was sharp, and the audio was pointed. The frame rate was fluid.

I ran a simple test: recording with each device. After calibrating my monitor with Pantone's huey Pro (another highly recommended product), I discovered that under the same conditions, the Vado led the pack in video. The audio was much fuller with the Zi6, but what's that matter if the video comes out less than stellar (which it did, blurring all the way)?

There was a beautiful sunset happening outside, splashing the Seattle sky with orange and blue hues. The Flip Mino HD was undersaturated, and the Zi6 was a bit oversaturated. But the Vado HD produced closer to real-life color. While the Flip Mino HD and Zi6 appeared to take a closer shot, this was only because the Vado's wide-angle lens captured more imagery in every frame.

In loud situations, even when the subject is directly in front of the camera, the Flip Mino HD and Zi6 trump the Vado. Under normal acoustic conditions, the Flip Mino HD and Vado HD are on par (that is to say, subpar) sound-wise. Still, at the end of the day, the all-around best device in this mini-shootout would have to be the Creative Vado HD. ▲

You can dialogue with Chris at chris@cpumag.com

Chris Pirillo spends way too much time in front of the video camera, specifically on live.pirillo.com, which is a subsection of his blog at chris.pirillo.com. You can, of course, subscribe to Chris on YouTube if you're so inclined; he posts both silly and serious videos all the time. Sometimes he talks about software, sometimes he talks about hardware, and sometimes he talks about nothing at all. (And yet, people continue to listen.) On a whim, Chris set up a social network for tech enthusiasts at geeks.pirillo.com—in case you were getting bored with Facebook or MySpace. Follow Chris on Twitter to know more about this CPU *columnist than you ever cared to know.*

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- Easy removal of ODD cover

X-7 X-STATION

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- Efficient Internal Structure
- Supports Full ATX
- Supports largest graphics cards
- Supports 7 extension slots

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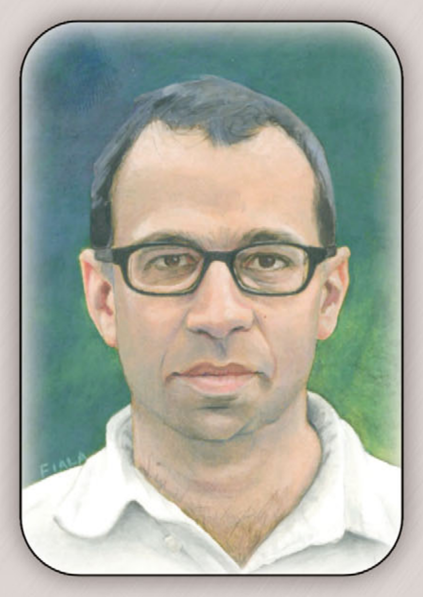
Open Sauce

by Peter Loshin

What Do Bad Economic Times Mean For Open Source?

If businesspeople learned anything last year, it's that failure is a great option if you can convince the government your business is too big or important to fail. Will the software industry demand a gold-plated bailout to help it beat the specter of open-source fanatics who give away software that's as good (and often better) than the proprietary kind? Not yet—not as long as they believe open source is a fad that'll fade away as the recession grinds on, or that it can be beaten by clever MBAs, or that it will implode under its own weight. Read on to see what I mean.



Peter Loshin publishes LinuxCookbook.com, a place to learn even more about Linux. And don't forget to check out the new Ninitata.com, Peter's family-friendly fun and learning site.

First, consider the "labor is not free" argument. As Andrew Keen put it last October, hard times mean the end of "the open-source mania." He says: "Mass unemployment and a deep economic recession comprise the most effective antidote to the utopian ideals of open-source radicals."

The point Keen misses is that people who write and maintain successful open-source software don't typically do it as charity. They do it to create software they can use themselves. Richard Stallman didn't write Emacs as just another text editor; he made it to do something—create and load new editing commands while using it—that no one had ever done before. It did something new, something that Stallman wanted it to do so he could be more productive.

Perhaps clever MBAs will rescue the proprietary software business. Consider "Divide and Conquer: Competing with Free Technology Under Network Effects," by Deishin Lee (Harvard Business School) and Haim Mendelson (Stanford Graduate School of Business), published in the January-February 2008 issue of *Production and Operations Management*. The answer to competing with open source? Act like Microsoft.

Lee and Mendelson advise everyone—not just software vendors—to (1) get into the market first with (2) a proprietary solution that (3) locks out competition and (4) locks in customers. If you don't hit the market first, do like Microsoft: Jump on the open bandwagon and "embrace and extend." Constantly add new features to stay ahead of the competition and use success in one market segment (e.g., Office for corporate users) to increase penetration in other segments (e.g., schools and home users).

This looks bad for open source, as it's impossible to argue with Lee and Mendelson: After all, Microsoft is the leading company in a notoriously competitive business. Why not use Microsoft's strategies? They have stood the test of time, and Microsoft is still on top today. But the game is still being played. It's not hard to imagine that in 30 years all our software needs are met with open-source projects developed under the auspices of not-for-profit foundations.

But could open source implode? Theoretically, open-source projects could start circling the drain, especially as so many turn to corporate sponsorship to keep things going. High-profile open-source projects occasionally hit bumps. OpenOffice.org is one recent example. Sun, which "owns" the project, is reportedly cutting back on its participation without encouraging new contributors to fill the void. Without a critical mass of contributors, it's next to impossible to keep a big software project going in any meaningful way, so that could spell trouble for OO.o.

Then again, any business (except, apparently, banks and automakers) can fail. When commercial software vendors fail, the customers are up a tree: There's no way to get bug fixes, new features, or support on new platforms. The end.

Not so with open source. Several projects based on OO.o are already in full swing and could carry the ball if OO.o were to disappear: Go-oo (go-oo.org) and OxygenOffice Professional (ooop.wiki.sourceforge.net) are fortified versions of OpenOffice.org, and NeoOffice (www.neooffice.org) is an OO.o port for Mac OS X. Even IBM dipped into OO.o code when it resurrected Symphony under a no-charge/proprietary license in 2007.

Can open source weather hard economic times? I'm confident open-source software can do anything proprietary software can. And then some. ▲

You can get saucy with Peter at
pete@cpumag.com

Getting Back The Signal

Can Web Radio Survive Success?

Have you heard? In America's buttoned-down offices, a quiet revolution is taking place in the way we listen to the radio in the background that fills our workdays. In just the last year, the share of at-work listeners tuning into Web radio over traditional over-the-air radio has ballooned from 12% to 20%, says Edison Media Research. About 33 million of us now listen to Internet radio in a given week. Among younger, college-age users, an astonishing 30% now prefer IP-based streaming services such as Pandora, Last.fm, Slacker, and countless user-generated Web stations or terrestrial signals that get redirected to Internet streams. A new and strong signal is disrupting radio as we know it.

Internet radio comes in many forms, but almost all of them are in ascendance. "Playlist"-style stations, such as Pandora and Slacker, allow users to create highly customized stations that stream music to their taste. Web-only radio stations are preprogrammed streams that resemble over-the-air radio but broadcast only on the Internet. The functionality and social networking features in Web radio have increased substantially in just the last two years, says Doug Perlson, CEO, TargetSpot, which provides advertising technology to Slacker, AOL Radio, and CBS stations. "If you are not careful as a terrestrial broadcaster, you could lose your audience," he says. And so the traditional radio broadcasters have added another layer of Web radio, over-the-air signals from hundreds of local markets that networks such as CBS and Clear Channel now stream to the Web. An entire generation of young people seemed to be lost in their iPods, but Web radio has re-energized this audience and over-the-air broadcasters want them back. IP listeners are powerful members of the viral music ecosystem, with 41% of listeners maintaining social network pages. "This is an audience they need to reach," says Perlson, and so the Web radio market has super-heated in recent months in a fight for share and brand loyalty.

Losing The Signal?

Even with 33 million listeners, the Web radio business model hit a wall this year as the royalty rates they had to pay music companies escalated to an untenable level. The government's Copyright Royalty Board, which controls the payments Web radio makes to copyright holders, sets new payment structures every five years. In 2007, "the panel came up with a bizarrely high answer," says Pandora founder Tim Westergren. The royalty rate escalated from $0.0008 per stream per user to $0.0019 by 2010. Those fractions of pennies per stream add up when 21 million Pandora customers are listening to three hours of music per session. Westergren contended his company was about to go out of business and that the new rates would require that $18 million of Pandora's projected $25 million in revenue would have to be turned over to music publishers. Royalties would become so onerous as these services became more popular that Web radio could fail by succeeding. "The panel just misunderstood the business of radio," he says.

The terrain of digital music rights is confusing, with different bodies having jurisdiction over discrete distribution such as digital downloads, streaming radio, or "limited downloads," where users can access specific songs as long as they pay monthly subscription fees. Even within Web radio models such as Pandora's and Last.fm's, individual companies are cutting their own separate deals. A spokesperson for Slacker says that "we have unique direct deals with all of the major publishers and thousands of indie labels."

Traditional radio and even CD sales reward rights holders with flat, one-time fees, says mobile and radio industry veteran

PANDORA
internet radio
PANDORA
Pandora, now on Windows
Download for Windows Vista
Download for Windows Mobile
available on select phones
Windows

Pandora, one of the most popular Web radio services, is already streaming 10% of its music to non-PC devices such as the iPhone.

Martin Kristiseter, founder of mSnap. Web companies are being unfairly charged in ways other channels of music distribution are not, many digital executives contend. With Internet radio, "You play one song 50 times and the artist gets paid 50 times. Pretty good deal for the label and the artist, but definitely an issue for the Internet radio business with limited resources," says Kristiseter. The roots of this dispute are in the basic disarray of the music industry itself, says Barry Parr, senior analyst, Consumer Product Strategy for Forrester Research. From piracy to the reduced revenues from digital distribution, labels "are a mess right now," he says. They are pressing for the highest royalty rates possible. As their previously unpopular stances against Napster and even individual music downloaders suggests, "looking like the bad guys was a good decision," he says. "They have been rewarded for that kind of behavior."

Music labels and traditional radio broadcasters often insisted that over-the-air stations were promotional vehicles for the industry, while Web radio was not. "The promotion argument just doesn't make sense," says Perlson. Web radio stations not only surface new music for listeners, they link directly to digital download stores such as iTunes, where customers buy the songs. "The biggest problem with the royalty issue is just the

Q&A Plugging Back In: Pandora's Tim Westergren

Just six months ago, Pandora founder Tim Westergren told *The Washington Post* that high royalty rates were forcing his Web radio company to face a "pull the plug kind of decision." When we spoke to him earlier this year, however, an agreement to revise royalty rates seemed imminent, and he envisioned a clear path to profitability. Usage, advertiser interest, and sharing a less onerous cut with artists suddenly seemed to make this model viable again.

CPU: You say that the standing, current royalty rate asks you to give music publishers three cents per hour for every stream. Why wouldn't that be a fair model that could support profitability?

Westergren: It is really the economics of Internet radio. Terrestrial radio by comparison does something like seven or eight cents an hour of revenue per user. Terrestrial radio pays no performance royalty. And they benefit from advantages of being essentially a monopoly in their own markets. You only have a small choice if you are a local advertiser. There is a certain dynamic that drives up their advertising rates that is not true of Internet radio because on the Web you have unlimited choice. It is much more competitive. So you end up in a place where a mature Internet radio will do about a nickel an hour. So you are talking about giving up 60% of your revenue in royalties, which is completely distorted compared to the historical rate paid for radio.

CPU: Terrestrial radio argues it promotes music for record labels and so shouldn't have to pay the same fees. Is there some reason why the music industry has not looked on Web radio in the same way?

Westergren: If you ask any label executive off the record, they will all tell you that Internet radio is promotional. Just come to our offices and look at our Inbox. It's full of CDs from every major label and independent artists everywhere who are dying to get their music on the service for the same reason they want to get played on broadcast radio. The idea that Internet radio is not promotional is nonsense.

CPU: What is their on-the-record complaint, then?

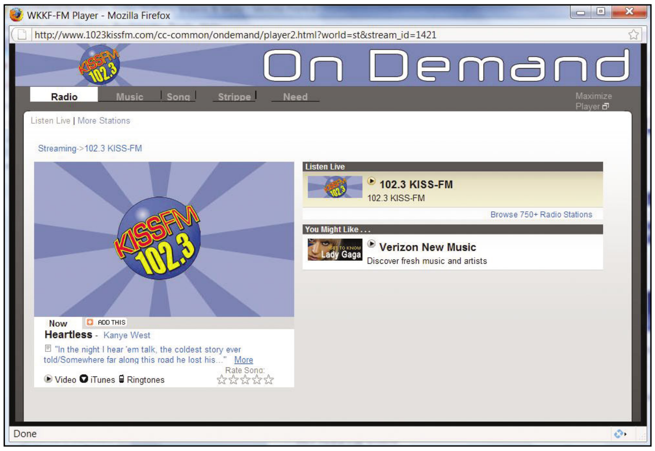
Westergren: That radio should pay more [too]. What the music industry is trying to do is rewrite the rules about royalties in radio. And they are going to go after broadcasters next.

CPU: With so much online competition, how do Web radio providers like you differentiate yourselves?

Westergren: The foundation for Pandora is unique, which is the music genome. A team of about 50 musicians listen to songs one at a time and analyze each song across about 400 musical attributes. That connects songs and creates playlists for us. We can personalize really quickly with an artist or song. We can also respond intelligently to feedback. So if you thumb up or down songs, we can translate that into musicological information. It is good at surfacing music you never heard before. About 70% of the music in our collection comes from artists that are not on a label. We don't rely on popularity. Music discovery is one of the key ingredients for an enduring relationship with the listener. ▲

fundamental unfairness. If you are going to charge one form of radio a different rate, there has to be a logical explanation. The music industry has been disrupted, and they are desperately trying to claw back any revenue they can."

The radio industry kept its own royalty rates low with the active support of trade associations like the National Association of Broadcasters, but Web radio had no such professional representative. Instead, some digital companies went to the people, asking their millions of users to pressure Congress to intervene in the royalty dispute. Apparently, the populist tactic worked because last fall legislators passed the Webcaster Settlement Act, which allowed Internet radio companies and rights holders to hammer out a more reasonable agreement among themselves by Feb. 15. As of this writing, final terms of the agreement were not public, but digital executives like Westergren indicate the new rates will let the industry, or at least his company, survive. "Suffice to say that we wouldn't sign an agreement that wasn't palatable," he says. "The business will work with the new agreement."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KISSFM 102.3
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Heartless - Kanye West
"In the night I hear 'em talk, the coldest story ever told/Somewhere far along this road he lost his..." More
Rate Song:
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Done

On-air radio gets into the act. Looking to win back the 20% of office-dwellers who now listen to Web radio, traditional radio is coming online.

Not all aspects of the upcoming agreement are ironed out to the point that all Web radio sees a clear path to profitability, however. At the end of 2008, The Copyright Royalty Board changed the rules for the reporting of music streams to the copyright clearinghouse SoundExchange, which monitors music use for the industry. Under the new rules, all digital music services would have to report every song played to SoundExchange, rather than the current system of reporting two weeks of playlists every quarter. The CRB argues that older policies provided too rough of an estimate of songs played, and the new system will be more accurate and fair to all parties. This new reporting burden may not affect larger companies, but small Web stations and college stations that stream online could be overwhelmed by the logistics of reporting every song played.

Making Web Radio Work

Whatever burdens the Web radio industry ultimately must bear, fair or not, it still needs to generate more revenue than it does now to survive. Ad support for Web radio is vital, but user expectations and tolerance for advertising is different online. Typically, on-air radio packs over 15 minutes of advertising into every hour, and that translates into about eight cents an hour for every listener. Web radio listeners are used to less interruption. Pandora, for instance, currently runs only visual display ads around its player. "There definitely will be more advertising in pure play [Web radio]," says Perlson. "It costs money to stream. A lot of these companies that launched are great applications but are still in startup phase so monetization has not been their number one priority."

Well, now it is. Perlson's TargetSpot is among the largest ad services that specialize in inserting short spots into Web radio streams from CBS and Slacker. Geico, Wal-Mart, and other major brands already buy ad time. Perlson has made the case to Web radio companies that their business models can work with just two to four minutes of audio ads every hour. "There are fewer ads on the Web, but those ads are of higher value because of the hyper-targeting with Internet radio." Digital delivery allows tighter targeting, even down to zip code or specific musical tastes, he says. Web radio should be able to ask for higher ad rates. And the Web piece is just the beginning. Pandora, Slacker, and Last.fm, among others, are already on phones for mobile IP radio streaming. Westergren says that 10% of all Pandora streams are to non-PC devices, the "vast majority" of which is to the iPhone. All of the major companies see their future in bringing IP radio off the desktop—not only phones, but TV set-top boxes and in-car audio.

Not so fast, counters Forrester analyst Parr. Even if the royalty question gets settled, Web radio still faces substantial business hurdles. Terrestrial radio's successful ad model has been local, but most of these Web services are global and may have trouble attracting the mom-and-pop hometown shops that finance your local shock jock. Worse, says Parr, "They have the typical Internet advertising problem of a very large undifferentiated audience." Mass audiences create huge amounts of traffic. But as online video and social networks have already demonstrated, creating massive online inventory around popular services only cheapens the value of the advertising.

And ultimately, Web radio faces the same issue the music industry does—unpredictable audience fragmentation and limitless competition online. They live in a context of pirated music, independent stations, and noncommercial hobbyists, all vying for audience and limited ad money. Parr is confident the platform can find a winning model. But Web radio is not immune to all of the digital forces buffeting the music industry. Technology has disrupted the way music not only gets heard, but also how it gets made, distributed, sold, and discovered. "We are completely remixing the way we are using radio . . . and TV," says Parr. "It is a very confusing and very fragmented market. Consumers have yet to make their preferences known. Everyone is on edge about how this thing will shake out." ▲

by Steve Smith

by Rob "CmdrTaco" Malda

Memory.txt

The Internet really doesn't have any memory. Every day, thousands of Web sites appear just as thousands more disappear, forever forgotten. Just as mysterious is the never-ending stream of updates that occur to millions of Web pages every single day. Often these changes are minor and unnoticed, but sometimes they are substantial and worthy of record.

Some pages are designed with this sort of dynamic change in mind. The front page of Slashdot changes every minute, and this doesn't really matter to anyone because every item that appears on the page is retrievable, but this isn't the case with all sites.

The inauguration of President Obama presented what may be a worst-case scenario of the problems created by this lack of online memory. The day before the election, WhiteHouse.gov contained a huge collection of speeches and videos and documents related to the Bush administration. When America got a new president, all the URLs linking to the old administration immediately broke. In their place was a shiny new site, a clean slate for new information. But the old information is gone now.

It's certainly not partisan to want government documents like those formerly on the Bush White House site preserved. Perhaps to be archived to the Library of Congress or maybe kept online on a bush.whitehouse.gov or an expresidents.gov archive. Of course, maintaining old Web sites is an expensive operation: Software needs to be maintained as security holes are found and presentation standards change, but this is probably something worth addressing in a more general manner for the 'Net as a whole and not just for official government record.

This problem has occurred many times in the past, including when the records of the Sydney Olympics were overwritten with the contents of the Beijing Games. This will only happen time and time again as big Web sites refresh to overwrite their contents as big new events occur.

Fortunately, systems such as the WayBackMachine exist and take a great step in the right direction. The WayBackMachine crawls the 'Net and mirrors copies of countless Web sites for future generations. In years past, this process was reasonably easy to do and not particularly data intensive, but as the Internet becomes a place increasingly dominated by video and audio, it becomes more and more of a resource burden for such a system to exist independently.

Of course, a host of legal issues rise up, as well. What happens if a document is forcibly removed from some Web site? Should an archival service such as the WayBackMachine be required to remove that information, as well? Or is such information a part of the public record and ought to be maintained as part of our history? My opinion is that information posted to the Internet should be forever maintained no matter what: This information creates important context that will matter in the future.

These issues need to be resolved, or else we run the risk of creating a sort of memory lapse a generation down the line. It's still possible to get microfilm for newspapers going back even several centuries. That information is carefully preserved by the librarians of today for the children of tomorrow, but nothing really exists today that is capable of doing anything like this on a truly large scale.

Perhaps something like the WayBackMachine needs to be expanded to include all the multimedia content of the modern Internet. Maybe a large entity that already maintains a huge archive of historical content, something like Google, could create a nonprofit entity that gets regular snapshots to archive and share with the Internet for all time. It's a complicated matter, both technically and legally, but I think the next generation deserves access to the information created today, just as we all have access to the magazines and newspapers and television shows created by the last one. ▲

Contact me at malda@cpumag.com

Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

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amazon.com | buy.com | COMPUSA We got it. We get it. | DELL | Fry's ELECTRONICS | J&R JR.com | MICRO CENTER The Ultimate Computer Store | newegg.com | TigerDirect.com | ZipZoomfly.com

At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for the most part) love and recommend, read on.

Audio Video Corner

by Blaine A. Flamig

$9.99
Columbia Records
www.brucespringsteen.net

"Working On A Dream"—Bruce Springsteen

Some critics will declare 2005's "Devils & Dust," 2007's "Magic," and now "Working On A Dream" as Bruce Springsteen's best stretch of writing and recording during his storied career. Springsteen's 1973-1978 run still ranks higher with us. Still, we'll agree that with 2006's magnificent "We Shall Overcome: The Seeger Sessions" thrown in, Springsteen's work since 2000 is his most divergent and musically challenging. "Working On A Dream" puts Springsteen in Chicago blues mode on "Good Eye," going neo-folkie on "Tomorrow Never Knows," and striking a pop pose on "Surprise, Surprise." What's missing is the full E Street Band attack, as Springsteen throttles back the energy in favor of refinement. Still, this is the Boss, arguably making "Working On A Dream" worthy by default.

$9.99
Sony
www.franzferdinand.com

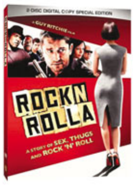
"Tonight: Franz Ferdinand"—Franz Ferdinand

It's tempting to write off Franz Ferdinand's third release "Tonight: Franz Ferdinand" as the same ol' bouncy, guitar-laden dance tracks we've come to expect from the Scots since "Take Me Out" got our bods in motion in 2004. Though there's some truth in this summation, "Tonight" bobs and swerves just enough to set it off from 2005's "You Could Have It So Much Better" and 2004's genre-breaking "Franz Ferdinand." "Tonight's" differences reside in the volume being turned down on the guitars in favor of more catchy hooks and melodies. Still, there's plenty of guitar to absorb here, as the stutter-stepping "Send Him Away" and hypnotic groove-fest "What She Came For" would suggest. FF continues to mature on "Tonight" but (thankfully) without completely abandoning what it does best.

$27.99
New Line Home Video
www.prideandglorymovie.com

Pride and Glory

Director Gavin O'Connor ("Miracle") tries to put a new spin on the good cop vs. bad cop theme in "Pride and Glory," a gritty New York City-based tale of a family of police officers torn apart by a horrible, inconvenient truth. Unfortunately, unlike Martin Scorsese's "The Departed," which deftly tied multiple plotlines together, O'Connor's results aren't as fluid. Instead of burrowing into the darkness, honor, and lack thereof that drive brothers Ray (Edward Norton) and Francis (Noah Emmerich), brother-in-law Jimmy (Colin Farrell), and father Francis Sr. (Jon Voight), O'Connor distracts our attention with side stories that lessen the blows we should feel when Ray and Jimmy collide and Francis Jr. and Sr. must face what they've allowed to occur. O'Connor does have a gift for grit, though, which "Pride and Glory's" excellent cast knows what to do with when allowed.



$19.49
Warner Bros.
rocknrolla.warnerbros.com

RocknRolla

Some celebrity junkies think Madonna got the short end of the stick in her recently dissolved marriage to Guy Ritchie. We think Ritchie suffered most, or at least his films did under the Madonna-Ritchie union. Fortunately, "RocknRolla" inches closer to the smart-aleck storyteller we've liked best in Ritchie. The problem with "RocknRolla," a romp through London's mob, punk rock, and high society worlds, is all parties concerned feel toned down as they separately pursue finding a missing painting that will right all wrongs. That's not saying "RocknRolla" isn't rife with quirky characters that made "Snatch" and "Lock, Stock and Two Smoking Barrels" so memorable. The characters just aren't quirky enough. Tom Wilkinson as main baddie Lenny Cole, for example, is sinister by most standards, but he ain't no Brick Top. Here's hoping Ritchie's new marital status leads him back to his slyly focused storytelling origins.

See the full reviews from A/V Corner at www.cpumag.com/cpuapr09/AYL

DVD Byte

4/7

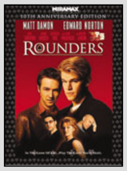
i.o.u.s.a.

Max Fleischer's Superman 1941-1942

The Paper Chase: Season One

4/14

Rounders 10th Anniversary



Exosquad: Season 1

Splinter

House of Saddam

4/21

X-Men Trilogy

My Own Worst Enemy: The Complete Series

4/28

Seven Deadly Sins

The Price of Sugar

Prince of Persia

Joy In The Journey — *by Dr. Malaprop*

$59.99 (360, PS3); $49.99 (PC) • ESRB: (T)een • Activision • www.princeofpersiagame.com

The new Prince of Persia is a “reboot” of the series, but it’s not aligned with the narrative or characters from the original Jordan Mechner 1989 game. This is a new experience with the same core gameplay mechanics. The new Prince is one in moniker only. The adventure begins when our hero, in search of his treasure-laden donkey, stumbles upon a damsel in distress. The damsel is Princess Elika. She’s trying to save the world from the recently uncaged God Of Darkness, Ahriman. Needless to say, the Prince finds himself on an open-ended journey with Erika as his persistent companion.

Narrative gets delivered via a few cut scenes, but this yarn is mostly optional and unfolds as you interact with Elika, should you choose to initiate the dialog. The ongoing banter that lasts through the 12 to 15 hours of single-player gameplay is charming, thanks to the strength of Elika’s character. However, she serves as more than narrative candy. Her companionship is an integral part of the design. Elika’s gameplay role is to help you navigate areas where your acrobatic prowess falls short. You can use Elika to jump farther, and she will automatically jump in to save you and restore you to solid ground. She also ensures that you never die. That’s a double-edged sword for hardcore gamers who may cry foul regarding the game’s difficulty, but this daring gameplay decision fits with the smooth flow. We enjoyed this element greatly because there were no load/save screens for death. Bravo.

Four primary stages are made up of multiple sub-stage levels (called “lands”). All the lands are corrupt, and you’ll help Elika get to and heal them. How you work through to the end of each land is open-ended, but all feature an end boss. Naturally, you will run into your fair share of Ahriman’s corrupted souls in one-on-one combat, where you’ll string together stylish combos with Elika, take out enemies, and continue your journey. Upon healing the corrupted lands (a very memorable animation), you’ll spend time crisscrossing the same level in its eye-catching healed state to collect the light seeds needed to unlock other areas. Some logic-based puzzles along the way will hold you up but not bring you to a hard stop.

Visually, the game is arresting in the way Okami was in 2008 or the film “What Dreams May Come” was in 1998. The cel-shaded look of both the characters and environments combined with seamless animation make the new Prince of Persia instantly memorable. The game’s forgiving movement makes moving through the intricately designed levels flow naturally.

The PC version of the game does not suffer from being a port of a console game, which is quite a compliment to Ubisoft. The PC’s keyboard/mouse controls felt as fluid as the Xbox 360 and PS3 controller experiences. That’s not something that could be said for the prior PoP games released in the past decade. The game’s graphical prowess also noticeably outshines the consoles for those with powerful rigs.

Prince of Persia’s smooth action-oriented platforming, friendly game design, and breakthrough visuals make it a winner on both PCs and consoles. It’s not often such a creative but familiar game comes along and charms us happily into submission. We look forward to the sequel (right after we get our hands on Assassin’s Creed 2 in 2010). ▲

Saints Row 2

Imitation Is The Sincerest Form Of Flattery

— by Dr. Malaprop

$59.99 (360) • ESRB: (M)ature

THQ • www.saintsrow.com

Not all open world games are the same: Note the disparity among Grand Theft Auto 4, Crackdown, and Saints Row 2. All are open world, prominently feature mature gameplay, and boast similar mechanics. Yet all feel completely different. GTA4 is based in a larger-than-life reality. By contrast, Saint's Row 2 eschews being GTA4 lite by being overtly ridiculous in its city portrayal.

You awake from a coma in a jail hospital five years after the original game's ending. The in-depth character creation process provides you with nearly limitless variety before you're let loose in an effort to reform the Saint's Row gang. Missions are of the run-and-gun nature, and gameplay is focused heavily around the action. The game features excellent melee combat and better car controls than GTA4. The AI is daft, but the action is impeccable and humorously over-the-top.

You may have missed Saint's Row 2 in the barrage of games released over the holidays, but it's one that deserves to be played if you enjoy the genre and aren't easily offended. The console version plays much better than the PC game, so choose wisely. ▲

MIRROR'S EDGE

Innovation Can Require Patience

— by Dr. Malaprop

Mirror's Edge is a first-person parkour game, where the goal is to move quickly and efficiently from one point to another. An example of parkour is the James Bond chase scene through the construction site in 2006's "Casino Royale." Mirror's Edge is set in the pseudo-futuristic and dystopian metropolis of Daily City. Free-dom of speech will get you arrested, and corporations are king. There are couriers, known as Runners, who traverse skyscraper rooftops to deliver information. You are Faith, one of those couriers. You'll be spending your time running and fighting to prove the innocence of your sister, who's just been framed for murder.

The high-contrast, minimalistic look gives Mirror's Edge a unique and immersive visual style that fits well into the draconian world. The visuals encourage you to move, almost glide, through the environments. A red-colored strip provides Faith with in-game direction as she sprints, leaps, rolls, zips, and fights through each of the nine chapters. The feeling of motion is the game's high point and will get your adrenaline pumping, but the repetitive try-and-die nature of many jump puzzles was frustrating.

We played the game on both the 360 and PC. The control scheme is comfortable on the consoles but sometimes feels difficult with the keyboard/mouse. Fortunately, the PC version controls fine with an Xbox 360 controller. This is a game that begs a sequel with some proven design sensibilities. Definitely worth a play-through. ▲

$59.99 (360, PS3); $49.99 (PC) • ESRB: (T)een

Electronic Arts • www.mirrorsedge.com

playon™

Stream TV Shows To Your Console

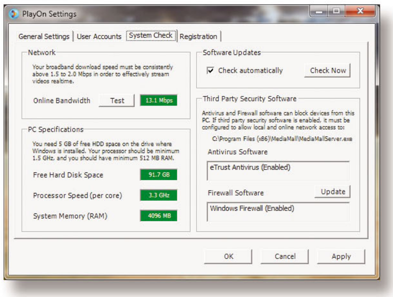
$29.99 (PC) * ESRB: N/A • MediaMall Technologies
www.themediamall.com/playon • CPU Rating: ●●●●

Any self-respecting computer power user with an Xbox 360, PlayStation 3, or HP MediaSmart TV can use a PC to stream video from online content providers, such as CBS, CNN, ESPN, Hulu, Netflix, and YouTube, with PlayOn. The PS3 does not support Netflix viewing, but with PlayOn it does. To use Netflix on an Xbox 360, you need to pay for an Xbox Live Gold account, but with PlayOn you can watch Netflix with the default free Xbox Live Silver account.

The software transcodes from streaming video formats to the network device in real time. Installation is painless. Just install; enter your pertinent account info for Hulu, Netflix, and YouTube; reboot; and then let the PlayOn Media Server sit in the background. We tested version 2.29.3302 for a month under both Windows Vista and the Windows 7 beta in daily use with minimal issues.

Our test PC was an Intel X9650 system with 4GB streaming over a 100Mbps home LAN from a D-Link DGL-4300 connected to a DGS-2205 that was in turn connected to an Xbox 360 and PlayStation 3. We enabled Antivirus and Windows Firewall in the Media Server settings. PlayOn Media Server's tests measured our broadband bandwidth at 10 to17Mbps during the month of testing.

On the Xbox 360, we navigated to My Xbox, then My Videos, and selected the PlayOn:<pc name> source to access the online streams. Similarly, on the PS3's XMB, we navigated to Video and PlayOn <pc name>. From there it was as simple as navigating among the various content providers to watch our shows. The quality of video was good (work is being done for future HD support), and we watched Internet TV on the couch. You can fast forward, rewind, and pause the video. We ran into occasional bugs, but the overall experience impressed us enough to purchase a license. ▲



Your broadband download speed must be consistently above 1.5 to 2.0 Mbps in order to effectively stream videos realtime.

Online Bandwidth: 13.1 Mbps

☑ Check automatically

Antivirus and Firewall software can block devices from this PC. If third party security software is enabled, it must be configured to allow local and online network access to:

C:\Program Files (x86)\MediaMall\MediaMallServer.exe

You need 5 GB of free HDD space on the drive where Windows is installed. Your processor should be minimum 1.5 GHz, and you should have minimum 512 MB RAM.

Free Hard Disk Space: 91.7 GB

Processor Speed (per core): 3.3 GHz

System Memory (RAM): 4096 MB

Antivirus Software: eTrust Antivirus (Enabled)

Firewall Software: Windows Firewall (Enabled)

Be your own broadcaster. PlayOn brings Web video to your Xbox 360 or PS3.

Logitech G13 Advanced Gameboard

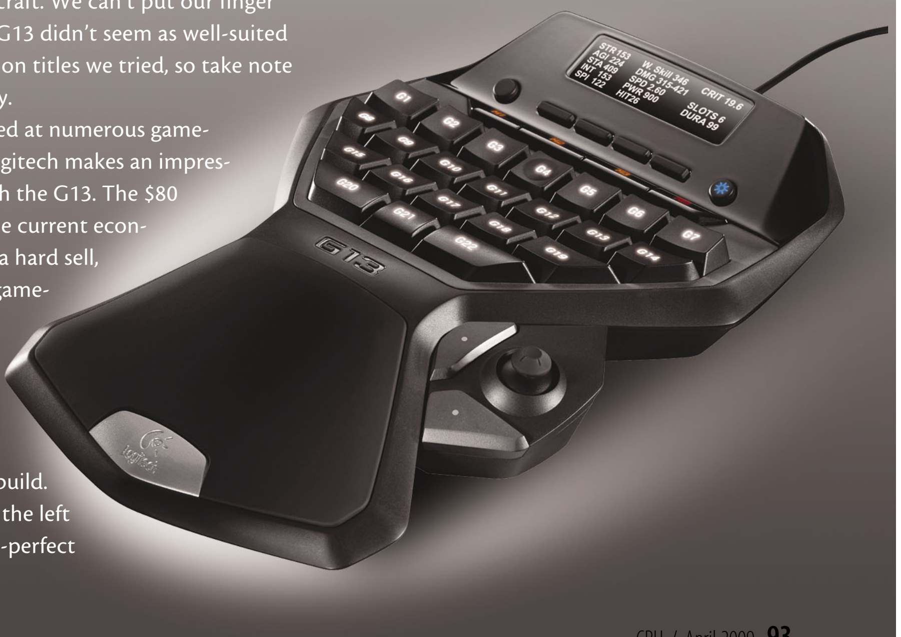
Now With LCD & Analog Stick

$79.99 (PC, Mac) • ESRB: N/A • Logitech
www.logitech.com • CPU Rating: ●●●●◖

The stylish new G13 is a serious USB gameboard for serious gamers with a serious price tag. It features 25 programmable backlit keys, a programmable mini-joystick that functions as a D-pad, macro programming on the fly, three memory functions, a 160- x 43-pixel monochrome LCD, customizable backlighting, built-in memory, and an ergonomic design.

The gamepad is beefy. Rubber feet and a weighted front prevent it from sliding. The WASD keys have gentle concave indentations to easily identify them when gameplay gets frantic. The rubber hand rest rolls up, transitions down into the keys, and then back up for the LCD. It feels very comfortable for long-term use. You can create a custom color for the LCD and backlighting. That's useful because you can use one color for each of the three memory functions, thus giving each key three functions and giving you the ability to switch speedily between functions and identify them. Onboard memory lets the device retain profiles without needing to reload when unplugged. The LCD Manager software provides additional tweaking and lets you see in-game stats for supported titles, such as World of Warcraft. We can't put our finger on it, but the G13 didn't seem as well-suited to the FPS action titles we tried, so take note before you buy.

We've looked at numerous gameboards, but Logitech makes an impressive splash with the G13. The $80 premium in the current economy could be a hard sell, but of all the gameboards we've tested, this is our first choice for comfort, functionality, and build. It's perfect for the left hand and near-perfect (minus use of the joystick) for the right hand. With more than 11 million World of Warcraft gamers in the world, Logitech may just be onto some strong purchase potential. ▲



by Barry Brenesal

Mnemonics For Dummies (Including Me), Part 2

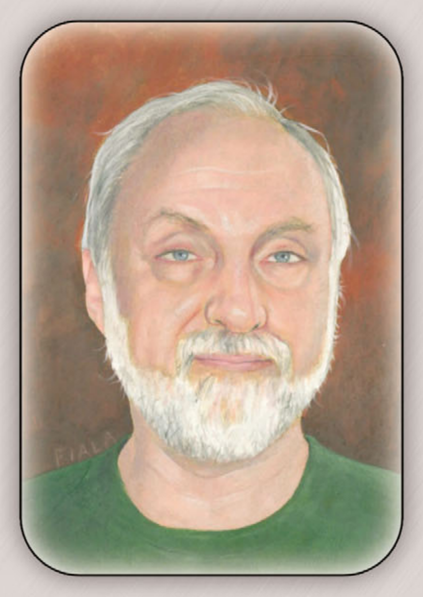
A Jesuit missionary in the late 16th century, Matteo Ricci spent most of his adult life in China, where he argued religion unimpressively with the leading Confucist scholars of the day. Ricci realized that if he was going to make social and political inroads as an outsider, he would need to provide its ruling elite something they would come to value highly but didn't currently possess. The jewel among jewels that he cleverly offered was mnemonics, viewed as an excellent mental aid by the first modern bureaucratic state. The Method of Loci that Ricci taught—self-designed images in a mental memory palace—no doubt gave him better access to influential Chinese than any number of religious tracts.

Ricci's own background in this field assisted in his dual training of religious and humanist materials on the one hand and the mathematical sciences on the other. Memorization of the former supplied printing matter when, toward the end of his life, he lacked books for his printing press. The latter was among the tools that assisted him in the construction of an accurate (for the time) world map, all place names transcribed and translated into Chinese. It proved so popular that it became a plagiarized classic and ultimately assumed the honor of being inscribed onto six 6-foot-wide panels in the Peking Palace of Zhu Yijun, the Wanli Emperor.

Next, to Giulio Camillo and his memory theater. Like several Renaissance futurists and Southern European court philosophers, he mixed Christian learning, the Jewish Cabala, and Greco-Roman pantheism in an attempt to understand divinity. Where Camillo differed from others was in his creation of a three-dimensional room one could enter to view an enormous range of memory-focusing divine attributes and images. He only acquired sufficient funding to realize a small part of his efforts but apparently enough to create a traveling edifice that permitted both King Francis I of France and himself to move freely within. Camillo wrote a short book on his idée fixe toward the end of his life, involving a huge room with a plethora of platforms, columns, and objects laden with symbolism to concentrate the mind on the divine. It was, in effect, a Gothic cathedral out-of-time, mixed with enough Jewish and pagan ideas to horrify any unworldly abbot into a heart attack.

Finally, we come to one of the most fascinating figures of the Italian Renaissance, Giordano Bruno. He is best remembered today as a supporter of the Copernican theory (you know, the one that says the earth moves around the sun, except during moments of extreme self-doubt), for which, we are told, he was burnt at the stake. Though many scientists revere Bruno as a result, neither statement is remotely accurate. Bruno was burnt because, despite being a Dominican friar, he repeatedly promoted a new solar religion with himself as its high priest. Similarly, he didn't adopt Copernicus' heliocentric theory so much as he adapted it. Bruno claimed in print that Copernicus misunderstood his own theory, being "only a mathematician," and that it was really a prophecy about solar-based religion. Far from being a pioneering scientist and fearless truth-speaker, Bruno was a metaphysical neo-Platonist; a boastful, brilliant, and vindictive author; and a prodigious memory expert. He could reel off dozens of pages of satirical blasts he'd written at the drop of a hat and seemingly recall every conversation he'd ever heard.

Bruno published works that combined brutal, parodistic diatribes at his enemies, traditional memory enhancement advice, and a heavy dose of Hermetic religion, involving astrology and (largely) Roman gods. His amazing fecundity of imagination is everywhere evident, as in a list of figures he gave that invented basic technologies of advanced civilization. Among these, Bruno included Chiron, for surgery; Suah, for chiromancy (palm reading); Archimedes, for a model of the heavens; Hostanes, for contacting demons; and Prometheus, for animal sacrifices. A scientist he was not. He probably would have made a great guest on a late-night talk show, though. ▲



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.

Wax nostalgic with Barry at
barry@cpumag.com

Software Tips & Projects

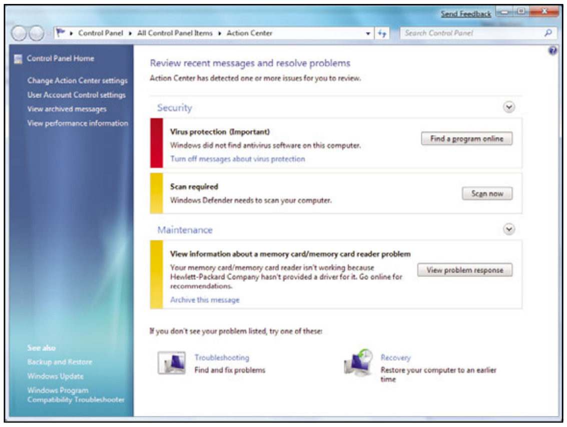
Windows 7: The Cool Stuff

In early January, Microsoft released a public beta of Windows 7, the next iteration of the ubiquitous operating system. We're sure that many *CPU* readers were among the 2.5 million tech wonks who lined up to see what Microsoft was up to and whether this OS succeeds. This month we have a special edition of Tips for anyone curious about the new features. If there are still beta copies left for distribution in the program or Microsoft decides to release more, you can find the OS at www.microsoft.com/windows/windows-7/default.aspx. This promises to be the most open development cycle we have seen for an imminent version of Windows, so don't be surprised if Microsoft lets more betas out into the wild.

Fair Warning

Advance word about Windows 7 has been good, but don't be lulled into a false sense of security. This is decidedly a beta. Like Microsoft, we do not recommend using this early prerelease version on a primary machine. By all means use it on a spare PC or install the beta to a separate hard drive partition. We suffered a total system freeze within the first hour of use, and some of the hardware still was not locating all the necessary drivers. We won't walk through the details of downloading the ISO file and burning it to a DVD, but once you have a Windows 7 installation disc made, you can either reboot your PC directly into the bootable disc or pop the disc into a running version of Windows to install from there.

Two caveats right off the bat for the beta. While many of us are averse to letting Windows Auto-Update, one of the first things you should do after installing the beta is run Windows Update in order to find all of the device drivers that were not included in the original distribution. Our laptop test system lacked Nvidia video drivers and proper audio drivers until we ran the update. Our Windows Experience Index literally doubled as a result of the update.


Send Feedback
Control Panel ▸ All Control Panel Items ▸ Action Center
Search Control Panel
Control Panel Home
Change Action Center settings
User Account Control settings
View archived messages
View performance information
See also
Backup and Restore
Windows Update
Windows Program Compatibility Troubleshooter
Security
Maintenance
Find a program online
Scan now
View problem response
Turn off messages about virus protection
Archive this message
Troubleshooting
Recovery

Review recent messages and resolve problems

Action Center has detected one or more issues for you to review.

Virus protection (Important)

Windows did not find antivirus software on this computer.

Scan required

Windows Defender needs to scan your computer.

View information about a memory card/memory card reader problem

Your memory card/memory card reader isn't working because Hewlett-Packard Company hasn't provided a driver for it. Go online for recommendations.

If you don't see your problem listed, try one of these:

Find and fix problems

Restore your computer to an earlier time

The new Action Center panel lets you access and act on Windows system messages. Here, you can find a third-party antivirus program.

The second caveat regards security. To ensure the security of this PC and your network, you will want to add antivirus protection. In the Start search bar, type Action Center to bring up a window of alerts and maintenance functions. In the Security box at the top, you should see a warning that this PC is not protected against viruses. Windows 7 does activate a built-in Microsoft Defender spyware tool and turns on the firewall. Nevertheless, use the Find A Program Online button to bring up a page of security providers for the beta release (AVG, Kaspersky, and Norton as of this writing) and choose a program. Now you are ready to play with Windows 7 somewhat safely.

The Missing Stuff

You may notice that the beta is missing some expected elements of Windows, such as Mail. You can get Win7 up-to-date if you navigate to download.live.com and download the Live Essentials package, which includes the Messenger IM client, Mail, and the Writer blogging software, as well as the Photo Gallery and Movie Maker applications. This pack can help you get more functionality without loading all of your own programs. Clicking any of the program's links on this page also lets you download each individually.

The Jiggly Interface

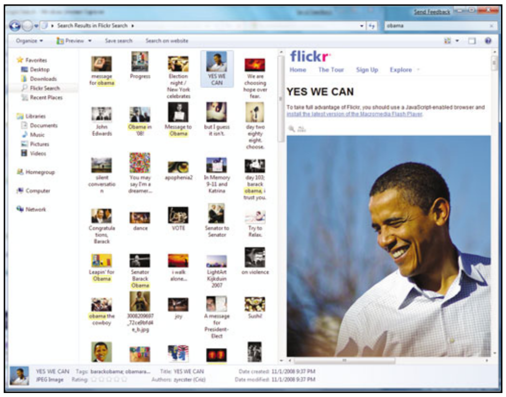
Out of the gate, try something fun. Open several windows at once, grab the top of the frame of one window, and shake it back and forth. The rest of the open windows will minimize. The keyboard shortcut for the same function is Win+Home. Now hold the Win+Down arrow to minimize the current window and Win+Up arrow to make it fullscreen. Holding Win+Right arrow or Left arrow will dock the current window to the right or left edge of your Desktop.

As all Windows 7 previewers note, the Vista Sidebar has been replaced by Desktop Gadgets that can be placed anywhere on the system wallpaper. But how do you easily surface those Gadgets when your Desktop is cluttered? A new Aero Peek function lets you reveal the underlying Desktop in a couple of ways. Move the mouse to the lower-right corner of the Taskbar. Hovering over the small vertical rectangle to the right of the digital clock activates Aero Peek, which dissolves all open windows into a translucent outline that reveals the Gadgets beneath without having to collapse all of those windows. Clicking this rectangle will activate the familiar Show Desktop routine, but Aero Peek is good for checking headlines and other feeds if you don't actually need to interact with them. The same function has a keyboard shortcut in Win+Space. Keep the Win button depressed to hold the peek-a-boo effect and release it to make the windows reappear. An alternative shortcut to surfacing Gadgets is the Win+G key, which puts them on top of all windows.

Where's My Quick Launch Bar?

Power users may notice that the Quick Launch zone of one-button shortcut icons is missing from the Taskbar. The functionality has been integrated into the standard Taskbar. Right-click a program in the Programs menu to find an option to Pin To Taskbar, and it will be available there permanently. You can drag and drop icons on the Taskbar to rearrange them. Right-clicking a Taskbar icon brings up contextually relevant functions. For instance, in Internet Explorer 8, you can see shortcuts to recently opened sites or files.

Purists may want to reinstate the old Quick Launch, and while Windows 7 developers discourage the practice, they have provided a way to do this. Right-click the Taskbar and use Toolbars to make a new Toolbar. In the Folder section, type **%userprofile%\AppData\Roaming\Microsoft\Internet Explorer\Quick Launch** and use the Select Folder button. Back at the Taskbar, right-click and uncheck the Lock Taskbar option. The familiar Quick Launch separator will appear. Right-click the separator and uncheck Show Text and Show Title. Now relock the Taskbar. You can drag and drop items into the Quick Launch bar, and you may find the icons appear smaller than the rest of the Taskbar items.



Federated Search in Windows 7 uses third-party Search Connectors to extend desktop searching to online repositories like Flickr, YouTube, or any site with a search function.

Search To Infinity & Beyond

The new "Federated Search" in Windows 7 lets your Windows Explorer search box connect to remote online data repositories, such as Flickr libraries and Google News. Adding this functionality requires that various third parties write "search connectors," which are very simple files with the .isdx suffix. You can find one example for Flickr at www.istartedsomething.com/flickrsearch. Download the connector and run it. Open Windows Explorer and you'll find Flickr Search in your Favorites section. All you need to do is highlight that new item and run a query in the search box to pull in Flickr results. Under the Organize button, use the Layout/Preview Pane item to put thumbnails or file details of the results in one pane and a preview of the image itself in another.

Third parties and industrious hobbyists are writing new connectors all the time. Go to www.sevenforums.com and do a search of Search Connectors to surface a forum thread on new arrivals and even instructions on making a custom connector of your own. ▲

by Steve Smith

Windows Tip Of The Month

As all Windows tinkerers know, the CTRL+ALT+DELETE key combo brings up a full screen of options that includes logging off, switching a user, changing a password, and calling up the Task Manager. Of course, most of us press the three-button combo to access the all-important Task Manager, where we can abort hanging programs and processes. You can circumvent this time-consuming interim screen altogether and bring up the Task Manager directly by using the CTRL+SHIFT+ESC combination instead. This command will call up the Task Manager and highlight that last tab you used (Services, Processes, etc.).

Registry Tip Of The Month

Here is a classic Registry hack that many advanced users may have forgotten. If you use the Run command often to open programs through the command box, then Windows maintains a history of those commands in the drop-down menu. Because many command line commands can be long, this drop-down acts as a convenient shortcut to previously run commands. Privacy sticklers may be concerned about leaving past commands in the cache, however. You can selectively eliminate elements in this history by going to the Registry key HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\RunMRU. You will see Value Names, "a," "b," "c," etc., where the Data corresponds to the command you have used in the past. Deleting the RunMRU Key will delete all of the history. To target specific commands, simply delete values for the commands you do not want to appear in the drop-down history. The effect is immediate.

Infinite Loop

Cars Made From Coconuts?

Researchers from Baylor University in Texas have found a way to use coconut fibers to make various car parts, such as trunk liners and floorboards. Usually, coconut fibers are simply discarded, creating garbage. The researchers hope to turn that garbage into cash for coconut farmers and at the same time help keep the environment clean.

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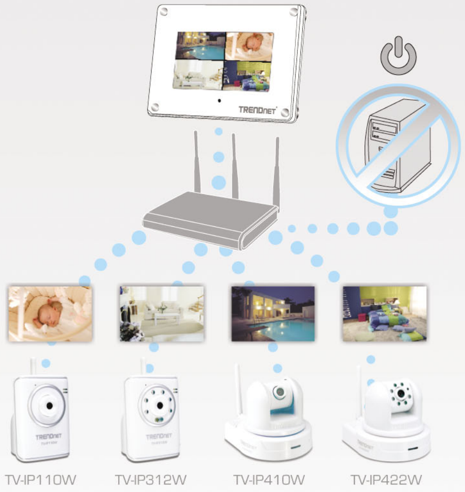

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Warm Up To Penguins

Paging Dr. Linux

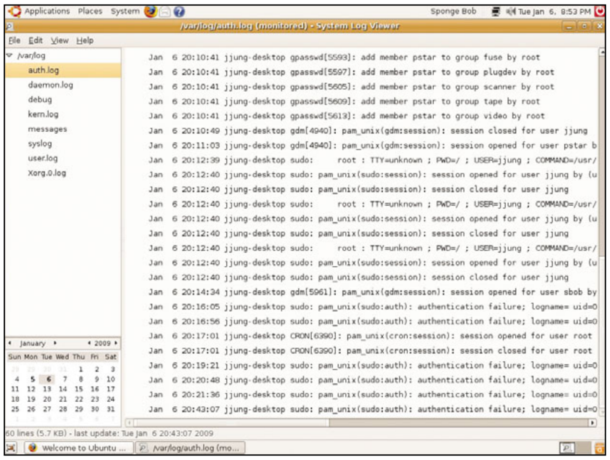
So you've been using Linux for a while, and things are running smoothly, until one day, something goes wrong. How can you tell what happened and how to fix it? In Windows, you might go to the Event Viewer, Device Manager, or Task Manager. Depending on what you find using those tools, you can often determine what's wrong and how to fix it. But where do you go on Linux? Where are logs of important system events stored? How can you identify hardware problems? What can you do if your Linux system is running slowly? In this column, we'll point you to the tools that can help.

In Windows, the Event Viewer is typically where you'd go looking to see if something went wrong on your system. You'll see if a program hanged, if there was a bad block on a CD, etc.; the Event Viewer usually has some information. In Linux, the system will generally log important information about itself but not the actual programs that you have running. If a program hung or terminated unexpectedly, chances are that you'll have to go back to the program to find out what happened.

Server-type applications and the Linux OS will typically log information in the /var/log directory. Different Linux distributions and server programs will log information to different files. One of the few universal log files in the Linux world is /var/log/messages, a general log file for Linux. The most recent activity and log entries will appear at the end of the file.

Legion Of Logs (And How To Make Sense Of Them)

But because each distribution logs events differently, the information won't necessarily be stored in the same location between distributions. When someone logs into Linux, it has to authenticate the user. In Ubuntu, /var/log/auth.log will list the authentication successes and failures. In Fedora, similar information will be in /var/log/secure. Authentication information is stored under /var/log/messages in openSUSE.



```
Jan  6 20:10:41 jjung-desktop gpasswd[5593]: add member pstar to group fuse by root
Jan  6 20:10:41 jjung-desktop gpasswd[5597]: add member pstar to group plugdev by root
Jan  6 20:10:41 jjung-desktop gpasswd[5605]: add member pstar to group scanner by root
Jan  6 20:10:41 jjung-desktop gpasswd[5609]: add member pstar to group tape by root
Jan  6 20:10:41 jjung-desktop gpasswd[5613]: add member pstar to group video by root
Jan  6 20:10:49 jjung-desktop gdm[4940]: pam_unix(gdm:session): session closed for user jjung
Jan  6 20:11:03 jjung-desktop gdm[4940]: pam_unix(gdm:session): session opened for user pstar b
Jan  6 20:12:39 jjung-desktop sudo:     root : TTY=unknown ; PWD=/ ; USER=jjung ; COMMAND=/usr/
Jan  6 20:12:40 jjung-desktop sudo: pam_unix(sudo:session): session opened for user jjung by (u
Jan  6 20:12:40 jjung-desktop sudo: pam_unix(sudo:session): session closed for user jjung
Jan  6 20:12:40 jjung-desktop sudo:     root : TTY=unknown ; PWD=/ ; USER=jjung ; COMMAND=/usr/
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Jan  6 20:12:40 jjung-desktop sudo: pam_unix(sudo:session): session closed for user jjung
Jan  6 20:14:34 jjung-desktop gdm[5961]: pam_unix(gdm:session): session opened for user sbob by
Jan  6 20:16:05 jjung-desktop sudo: pam_unix(sudo:auth): authentication failure; logname= uid=0
Jan  6 20:16:56 jjung-desktop sudo: pam_unix(sudo:auth): authentication failure; logname= uid=0
Jan  6 20:17:01 jjung-desktop CRON[6390]: pam_unix(cron:session): session opened for user root
Jan  6 20:17:01 jjung-desktop CRON[6390]: pam_unix(cron:session): session closed for user root
Jan  6 20:19:21 jjung-desktop sudo: pam_unix(sudo:auth): authentication failure; logname= uid=0
Jan  6 20:20:48 jjung-desktop sudo: pam_unix(sudo:auth): authentication failure; logname= uid=0
Jan  6 20:21:36 jjung-desktop sudo: pam_unix(sudo:auth): authentication failure; logname= uid=0
Jan  6 20:43:07 jjung-desktop sudo: pam_unix(sudo:auth): authentication failure; logname= uid=0
```

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60 lines (5.7 KB) - last update: Tue Jan  6 20:43:07 2009
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The System Log Viewer lets you easily look at various important log files.

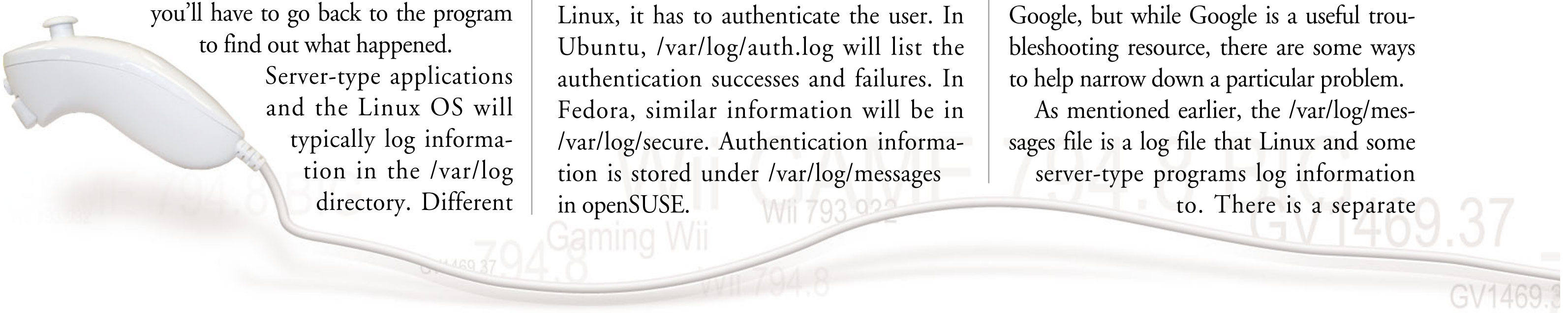
Despite this, most Linux distributions come with an easy way to look at important log files. For Ubuntu users, click System, Administration, and System Log to open a log viewer. Fedora users can access the same log viewer by clicking Applications, System Tools, and System Log. When you click a particular log file from the list on the left, it'll show you the entire log in the middle. Log entries are organized by date and are easily accessible with the calendar in the lower-left corner. Any boldface date on the calendar will have log entries. The viewer is dynamic: If you leave it running and something happens that would be written to the log, the activity will appear in bold at the bottom.

Users running openSUSE can access the log files by going to YaST>Miscellaneous>System Log. The interface is a little different, with a list of available log files in a drop-down menu at the top of the window and no organization by date. So if you want to find out what happened at a particular time, you're going to have to scroll through the file.

And if you want to check out the log files from a command line, you'll probably want to use the "tail" command. Typing **tail /var/log/messages** will display the last 10 lines of /var/log/messages. If you want to monitor a particular log file, you can type **tail -f /some/file**, where "/some/file" is the location of the log file. What the -f option does is tell tail to keep looking at the end of a particular file and not close. So, tail -f /var/log/messages is a useful method for watching for any important system events.

Now that you know where to start looking if you think you have a problem with your system, how do you make heads or tails of the information in the log files? The obvious answer might be to simply turn to Google, but while Google is a useful troubleshooting resource, there are some ways to help narrow down a particular problem.

As mentioned earlier, the /var/log/messages file is a log file that Linux and some server-type programs log information to. There is a separate



log file that is only written to for Linux kernel events. On many Linux releases, this log file isn't really a file but a 16K circular buffer. What this means is that after 16K of logging information is stored, it loops around to the beginning and starts overwriting the earliest entries. Also, because it's a buffer and not really a file, a lot of times there isn't a log file for you to view.

This is known formally as the kernel ring buffer, and the easiest way to view it is to launch a command prompt and type **dmesg**. This will show the contents of the buffer. Dmesg will show stuff that was noteworthy to the kernel. Generally, kernel events are mostly harmless, but sometimes it'll be something bigger. If a disk is starting to fail, the Linux kernel will be the first to know and report it here. So if you suspect something is going wrong with your hardware, check dmesg first. If there's a hardware issue, it'll be all over the dmesg output. If dmesg logs write failures, look to your hard drive as the culprit.

Further Down The Troubleshooting Trail

If you've gone through the log files and everything looks good, the next place to look for problems is with currently running programs. Every program that is currently executing in Linux is assigned a PID, or process ID. It doesn't matter if you're using Firefox or just listing files with ls; all processes have a PID. The PID is a unique number assigned to that process while the program is running. When Linux itself boots, the very first program it runs is the init program, and init will have a PID of 1. This is the process that starts everything, and as long as Linux is running, init will also be running. And because every program is somehow started by another program, every PID has a parent PID, the PID of the program that started it.

All programs on Linux are owned by someone, whether it's you, someone else on the system, or the system itself, and all PIDs have owners. Regular users can only stop their own processes, so you can't terminate someone else's running program. The user root is the superuser for the system and can stop any program, *even* init. Although it's clearly not recommended to stop init, we mention this capability as a cautionary note. Don't go around indiscriminately stopping processes you're not familiar with. Unlike Windows, Linux will let you stop critical system processes.

In Windows, you can get a list of what programs are running by launching the Task Manager. Linux also has some graphical programs that let you see what's running on your system at any given time. Ubuntu users can click System, Administration, and System Monitor and then click the Processes tab. Fedora users should click Applications, System Tools, and System Monitor to display the same list of currently running applications. For openSUSE users running GNOME, click Computer, More Applications, System, and GNOME System Monitor. This program shows you what's currently running and lets you sort the list by clicking the various column headings. If you want to stop a particular process, simply highlight it and then click the End Process button.

Initially, System Monitor will only show you programs that you own. To see all the processes running on the system, highlight a process and click View and All Processes. Because you can't stop a process that belongs to another user, you must supply the root password before you can terminate a process that belongs to another user.

And if you're running openSUSE and using the KDE window manager, you can get a comparable tool by clicking the SUSE icon, then Applications, System, Monitor, Performance Monitor. Then, go to the Process Table tab. The information is the same as the System Monitor but has a slightly different interface.

Reign In Processes From The Command Line

The ability to manage what's running on a Linux system isn't limited to just graphical tools. As you might expect, you can manage the programs running on a system from the command line. To get a list of the running processes, open a terminal window and type **ps -eaf**. This will show you information about every running process, including the username, PID, parent PID, and the actual running process. To stop a particular process, type **kill *PID***, where "*PID*" is the PID of the process you want to end. To terminate a process immediately, you can type **kill -KILL *PID***. The -KILL switch tells the kill command to stop the process, regardless of the consequences. This can be messy if the program is doing something, but if you feel it's hung up, the –KILL switch cuts right to the chase.

Now you know of the most important places that can help identify what might be wrong, so you won't be high and dry in the event Linux starts misbehaving. ▲

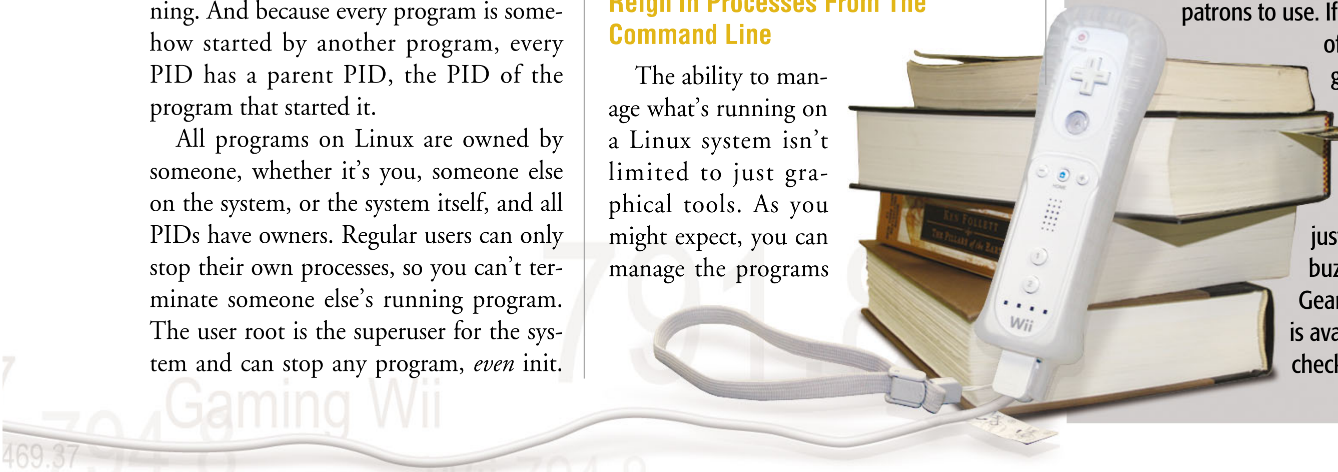
by John Jung

Infinite Loop

Public Libraries Surrender To Nintendo

We know plenty of people who would rather curl up with a Wiimote than a copy of "Crime and Punishment," but we apparently took for granted that libraries remained bastions free from videogame consoles. Libraries in the Portland, Ore., area have decided they need to get with the times and have added a Nintendo Wii for its patrons to use. If the trend of adding games and consoles to libraries continues, just give us a buzz when Gears of War 2 is available for check-out.

Source: www.portlandtribune.com/news/story.php?story_id=123143423916075400



Shavings From The Rumour Mill

by Mike Magee

Windows 7 Is A Miracle

You will have seen me banging on over and over again about the connection between hardware and software—and now networks, of course.

Vista, Bill Gates told me and a select bunch of others a few years back, cost more to develop than the original U.S. moon shot. He meant, I feel sure, that Microsoft paid as much to develop Vista as it originally cost, not taking into account inflation and the 30 years' difference in terms of interest.

Amazingly, it's only taken Microsoft 18 months to develop Vista's successor, Windows 7, which begs an interesting question: Did the software giant have the next OS ready before it even released Vista?

There is a conundrum about Microsoft that I've never really been able to figure out, although I have a clue. When IBM commissioned Bill Gates to produce an operating system for the IBM PC, did the company, in its heart of hearts, think that it was tolling its own death knell? I don't think so. IBM knew that it ruled the mainframe market, and in 1981 it didn't rule the midrange market; it knew that it needed to be in the PC market and that, in monetary terms, Microsoft didn't matter.

Right now, in the 21st century, it appears that IBM was right. It doesn't care about the PC market now; it certainly doesn't give a fig about Lenovo or ThinkPads or desktops, but it continues to make an awful lot of money by plying the trade of making mainframes and very advanced microprocessors for those mainframes. Is it going to sully its reputation by giving that information to its favoured partner, AMD? Heck, no. AMD has to pay through the nose for IBM to share any microprocessor information with it.

Of course, IBM (or Big Blue, as it used to be called) has a longer memory than a 120-year-old elephant. It doesn't like its former partner Microsoft and continues to push Linux for all it's worth. Back in its PC industry days, IBM was a willing Intel partner. In those days, Intel had the glamorous idea that it might make supercomputers but instead decided to attack the Sun Microsystems people of this world. No one knows how many secrets Intel and IBM share—it is ultra-confidential.

What's no secret these days, however, is how much Intel despises Microsoft. The CPU giant has helped Microsoft so many times to develop drivers for its operating systems that it has got really bored of helping. Naturally, this was done out of self-interest because Intel makes microprocessors and needs its now-despised partner to help sell them by doing fresh iterations of Windows. I have the feeling, though, that Intel is silently crowing behind the scenes about Windows 7. The market has changed so much and so radically in the last three or four years that Intel doesn't necessarily feel that it needs to be dictated to by Microsoft.

After all, Intel, IBM, and AMD have one thing in common: They all manufacture CPUs, and although that by definition means they need to know about operating systems, they actually don't care.

Ah! So what does Windows 7 bring to the CPU manufacturers' ball? Vista has been a roaring success, because the people who make PCs are tied so thoroughly into Microsoft's upgrade plans that they are handcuffed. Will it be better than Vista? Heck, I don't know. I am still using Windows XP on my Sony Vaio (in Sony's words, "I chose to downgrade") like many another, it seems.

But even Microsoft can't dispute that the better iterations of its operating system releases skip a generation. It was true for DOS, and it's still true for Windows, which would seem to be good news for Windows 7. As always, the drivers for peripherals will be the dominant tonic in Microsoft's next release. It can't rely on Intel to help it, IBM shuns it, and AMD can't afford it. Fly me to the moon. ▲

Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

Send rumours to "Mad Mike" Magee at mike@cpumag.com

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Wagging The Dog

by Rahul Sood

Nvidia, You May Now Kiss The Bride

AMD is hurting, badly.

I hate to say it, because I have friends working at AMD—good friends that go way back—as well as many who have left the company for one reason or another. The current economic situation isn't helping, of course, but I have seen quite a few good people there get laid off due to factors that many of us could have predicted months ago, with or without the recession.

The company is hemorrhaging cash; last quarter alone it lost more than $600 million, and no matter what AMD's management does, it can't seem to right the ship. Some would say that part of the problem is AMD's insistence on sailing in the same waters and that perhaps it's time for a totally different mode of travel.

Does AMD need a new leader? I'm not suggesting that Dirk Meyer is an incapable CEO, but do you agree that it's reasonable to conclude that AMD needs to find an entirely new direction? If you do, then follow my thinking; I believe the only way a company can go on a completely new path is if it hires someone from the outside. AMD requires a leader who can bring in some fresh thinking and, more importantly, who can bring the factions of ATI and AMD together with a believable long-term vision.

Is it wrong of me to assume that things are broken inside of AMD based on its recent execution? The company has lost some incredible people along the way and continues to trim, and morale is low. Believe it or not, hope still exists, but it's time for some profound, lasting change.

Jen-Hsun Huang is a strong leader, by every measure. Sure, Nvidia has screwed up a couple of times along the way, but somehow the company always scraps its way back to the top. Up until the beginning of 2008, Nvidia was a darling of Wall Street, and history should certainly repeat itself. Usually time heals all wounds, and on Wall Street good numbers can heal anything.

Jen-Hsun is aggressive, incredibly intelligent, and he wears his passion for Nvidia on his sleeve. Like Steve Jobs, he takes his brand very personally. Jen-Hsun's totalitarian-style leadership works because he has long-standing credibility and can inspire the masses when he's excited about something—his passion is definitely contagious.

Both AMD and Nvidia face huge challenges in the coming months and years. Intel is only getting stronger, leaner, and angrier. Mark my words: Intel's push into graphics will be anything but mediocre. The company is going all in, and has no plans to launch a crappy video card. Intel wants to control its ecosystem and increase its margins. Nvidia is doing a great job of pushing Visual Computing to the forefront, but it's really a technology that any graphics supplier will be able to support at some time.

If you're wondering where I'm going with all of this, here it is: Nvidia and the fab-free side of AMD need to merge. I don't think there will be any antitrust issues here because Intel still owns the lion's share of the graphics market, thanks to its integrated graphics chipsets. Jen-Hsun needs to run the show, to tear through the entire company and lean it out, promoting all of the top engineers and producers and optimizing middle management.

The new company should consolidate everything under the Nvidia brand and start to build out the most insane, most aggressive, most comprehensive strategy. It needs to control its entire ecosystem, and if the new company executes, it will be more than competitive with Intel. In this case, one plus one should equal five.

This, my friends, is likely the best way for AMD and Nvidia to survive and prosper in the long run. It will also create competition with Intel and push innovation to new levels. This is the Art of War.

Yeah, I might be asking for trouble, but I'm really tired of watching companies constantly beat their heads against the same wall over and over again, hoping something will break.

Let's just hope the higher-ups are listening; if you have any comments for them, please feel free to share them on my blog. ▲

Rahul Sood's love for computers started at the young age of 11. Much to the shock and dismay of his parents, he ripped apart his brand-new Apple //c and painted it red before turning it on. His parents' dreams of having a doctor for a son were shattered when college drop-out Rahul founded what is now one of the most respected high-end computer companies in the world, Voodoo Computers.

Send your opinions to this opinionated guy at rahul@cpumag.com

Technically Speaking

An Interview With James Lewis, Director Of The CSIS Technology & Public Policy Program

James Lewis served as project director for the Center for Strategic and International Studies Commission on Cybersecurity for the 44th Presidency, which has recently published its white paper. He is director of the CSIS Technology and Public Policy Program.

by Barry Brenesal

CPU: Your project consumed roughly a year and involved 40 expert participants that met formally four times, convened more than 30 briefings with government officials and private sector experts, created eight working groups, and participated in a range of congressional hearings and briefings. Anybody who reads a computer magazine is concerned about cybersecurity, but what do you say to the person who remarks, "Sure, it's important, but why do we need to put it into the hands of government?"

Lewis: Because this has become something that is damaging our national security. It's not something that the market can take care of itself, no more than we look to the market for defense of our airspace. This is now part of the conflict between nation states, and we have not adjusted to that.

CPU: But isn't that a bit similar to the alarmist position, "There are terrorists everywhere"? Are the problems with cybersecurity that profound?

Lewis: We tend to think of warfare in an old-fashioned way, that it's still a kinetic conflict. But there's an informational aspect to it, as well. What we're seeing now is that states may not go to war the way they did in 1914 and 1939. There may be low levels of competition, and a lot of it revolves around getting superior information, technological leadership. Fiber security plays a crucial and central role in that kind of conflict.

CPU: Your mention of cyber conflict between nations brings to mind recent actions that were supposedly undertaken by Russia within the last couple of years against both Georgian and Estonian government Web sites. Is that the kind of thing you're referring to?

Lewis: That's part of it. That was more of an adjunct to the kind of normal political—or in the case of Georgia, which occurred this past summer—military operation. We have to expect fiber to be part of what militaries do when they operate now. But there's a second level of conflict, one that's more important, and it mainly revolves around espionage and intelligence. That is the pilfering from the U.S. of technological and military secrets, business information, and intellectual property. That's where we see the immediate damage occurring.

CPU: Isn't there a problem that the incoming administration may regard your advice as useful but the subject itself as something that can be put on the back burner as a relatively low priority while they deal with a host of other political matters?

Lewis: I was at a meeting last week that included a counter-terrorism advisor in the White House at the end of the Clinton administration. He said that when the transition came in, he and Richard Clarke, whom he worked for, briefed the president on the threat of terrorism and the risks the U.S. was facing over the possibility of an exceptionally damaging attack. This was in 2001. He said that while the new team got it, and that they understood terrorism was a threat, it didn't fit into their more conventional way of thinking. We paid for that. His comment to the Deputy Vice-Chairman of the Joint Chiefs of Staff was, "Don't let this happen again. A new transition team's going to come in.

We've got a new threat. You have to make them realize the scope and the intensity of that threat."

CPU: Then how does one set about making the new people in office realize the importance of this?

Lewis: It's going to be tough. It helps that a couple of things have happened that can focus their attention.

The campaigns were hacked [last] summer. Some unknown foreign intruder got into the McCain and the Obama networks and got their data. The Department of Defense was hacked this past December. There have been other incidents that have occurred repeatedly over the last couple of years. Is this as important as a major financial crisis? No, it's not. But it's not something you can ignore.

CPU: You don't seem to have any mechanism in place for getting that message out to the public, if the mainstream media is anything to judge by. Certainly the DoD hacking story didn't make it into the headlines, nor did the media do much with the presidential campaign hacking material.

Lewis: I was talking with a senior official from the intelligence community about this. They have really good information on how much damage we're suffering, but they haven't been able to get the word out. Some of that was the Bush administration's preference for doing things in secret, so they classified a lot of this at very high levels. Some of this is a matter of protecting sources and methods: How do we know the damage is occurring? If I tell you, then you'll know how I figured it out.

There is a dilemma here, which is that this is a secret war. That doesn't mean we can't be losing it, and it doesn't mean we aren't being really hurt. It just means it's hard to tell people about it.

CPU: You mention in your report some very interesting figures to provide a bit of perspective. You point out that in the President's Fiscal Year 2009 budget requests there is $29.3 billion for Life Science research. National information technology R&D programs receive $3.5 billion. However, cybersecurity R&D gets $300 million.

Lewis: One of the examples I use is a comparison of planes and horses in 1913. If you'd asked any general which was more important that year or even the next, he would have said, "Horses." We're at that stage now. There's a big change underway. We all feel it, but we don't understand it, and we haven't adjusted to it. We haven't financed what we need to do to move to a different kind of world.

CPU: The federal government appears to have a problem getting to grips with the basic idea of the Internet, doesn't it?

Lewis: It goes against the way we've been organized for the last 50 years, and it goes against some of the accountability safeguards that have been built in for an Industrial Age, paper-based government. Here's an example I always think is funny: At the end of every presidential term, the White House has to print out all its email so they can be stored in a paper format. That's hundreds of thousands of messages printed out and put in a box. Crates and crates of printed out emails. Someone passed a law in the 1980s that said, "Store all these paper records," and the government hasn't gotten around to even changing that.

CPU: Let's take a very brief look at a few of the recommendations in your executive summary and just get a comment from you about each. "Lead from the White House."

Lewis: When, at the end of World War II, the U.S. decided that it was in a different kind of world and faced a global threat, one where you couldn't say, "We're not going to be safe anymore if we just focused on our borders and the waters 12 miles out." They created a very powerful organization, the National Security Council, that could coordinate military, diplomatic, intelligence, law enforcement, and economic activities, to build national security. It's still the most effective part of government.

CPU: I notice that later on in your report you recommend the establishment of a National Office of Cyberspace. This body would report to the NSC?

Lewis: It would report to the NSC or to the president. It should be in that complex, though. We said, "Look, you've got justice, state, DoD, the CIA, the Commerce Department, the Department of Homeland Security; powerful agencies, big agencies. Only one place can coordinate them."

CPU: The report also briefly mentions revitalizing the Presidential Privacy and Civil Liberties Oversight Board, which was part of the White House until Bush directed that it be moved into an independent agency. What was the likely reason for moving it out of government and doing so literally while exiting the building?

> We have to retackle the privacy and civil liberties issue.
> We have to assure people that there is adequate oversight.
> —James Lewis

Lewis: Some of it was a sense that it wasn't particularly effective. The people on it were well-meaning, but they weren't connected to policy. You've got to wonder if moving them out would make them even less connected.

We have to retackle the privacy and civil liberties issue. We have to assure people that there is adequate oversight. If you can make people comfortable, you can do a lot of things. If they're not comfortable, it puts a real break on what you can actually do to secure the nation.

CPU: "Regulate cyberspace." That's going to raise the hackles of a lot of people, isn't it?

Lewis: What does "regulate cyberspace" mean? It means that for critical infrastructure, you have to meet certain requirements for security. Just as with cars, you must have a seatbelt, obey traffic laws, etc.

CPU: You write of "avoiding both prescriptive mandates and overreliance on market forces," but where's the balancing pole you can use to walk that very fine line?

Lewis: It's something we'll have to develop. It's a problem across the board for government. It's easy to write regulations that spell out exactly what to do; and three years from now, they're out of date. It's also easy to say, "The market will take care of it." But it hasn't.

CPU: "Authentic digital identities."

Lewis: A very contentious and emotional item that makes people very excited. They think you're talking about a national ID card. We're not. What we're saying is you have to start making identification on the Internet stronger. There's a whole set of reasons for doing that. One is to protect critical infrastructure from risks we really don't need to take. Another is to make it easier for law enforcement to figure out who are the good guys. It might also start improving behavior on the Internet. If you have a strong credential, we as a society can be more confident people aren't going to engage in fraud.

CPU: It's going to be difficult to get this point across when you try to sell the idea. It's not the kind of explanation that can easily fit in a five-second sound bite.

Lewis: What we say is, do critical infrastructure. The rest, let it be choice or don't do anything, but for infrastructure, if it really is critical, we need to do something different.

CPU: The next recommendation is "Modernize authorities," and as you point out, U.S. laws for cyberspace are decades old. Are there in fact any laws out there governing cyberspace behavior and infrastructure?

Lewis: There are, but they're a very mixed bag. Some of them, such as the Privacy Act, are more than 20 years old. The Communications Surveillance Act: 20 years old. When you look at the laws and regulations governing critical infrastructure, some, like the financial sector, have loads of regulations, others have almost no regulation. It's an uneven picture, with things that were written for different technologies. The way the world worked in 1987 isn't the way it works now.

CPU: Who will write these laws? If you're going to try to work these through Congress, aren't you going to deal with a host of potentially crushing peripheral issues there?

Lewis: A number of people said we shouldn't put that recommendation in at all because Congress would just find it too challenging. We had seven people who'd been at the Justice Department, within our group. They had a long debate, but at the end of the day, they thought we needed to tackle this as an issue.

CPU: Obama himself was praised in some quarters as the first major party presidential candidate to really pay much attention to the Web. Do you think there's reason to hope from this that his White House might pay more attention to the pressing concerns for cyber security?

Lewis: Absolutely. If you look at the Clinton administration, they figured out it was a problem two years into their second term. The Bush administration figured out it was a problem three years into their second term. The Obama administration knows it's a problem coming in. Part of the reason they know this is because they realize the power of the Internet. Because they used it in their campaign.

CPU: You've undoubtedly been watching closely the team that's been built, piece by piece, over recent months. Are there any people in that group that make you hopeful that the next administration will pay attention to your report and your concerns?

Lewis: We were lucky in that five members of Obama's transition team were also our commission members and helped write the report. That gives me a little bit of confidence that some of the recommendations will get implemented. CPU

What does "regulate cyberspace" mean? It means that for critical infrastructure, you have to meet certain requirements for security.
—James Lewis

by Anastasia Poland

Under Development

A Peek At What's Brewing In The Laboratory

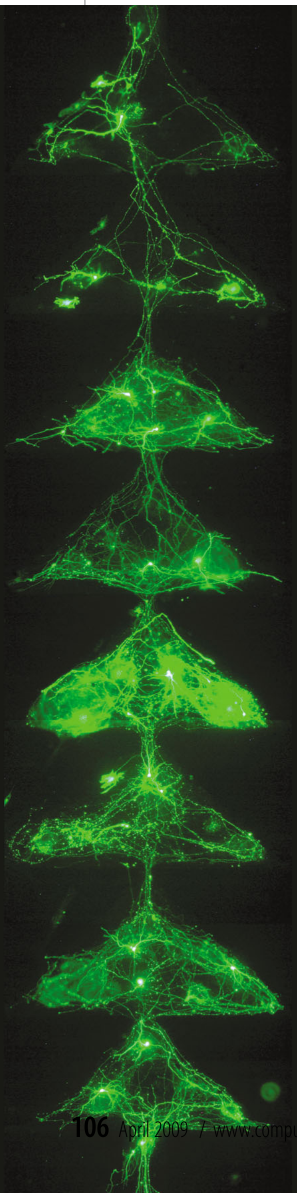
New 3D Imaging Sees Through Disguises

With disguises becoming better and more sophisticated (think prosthetics and professional-grade costumes), fugitives have had an edge over the law while passing through high security places, such as international borders or airports, even with surveillance cameras in place. Typical 2D cameras have not been able to suss out even relatively simple disguises, so human operators have to review the film to identify any possible criminals.

A new 3D imaging system, developed by Dr. Sooda Ramalingam of the University of Hertfordshire, is now able to identify people, even those who are disguised. Instead of just taking photos, this face-imaging system uses new mathematical algorithms with Matlab software (a technical programming environment used for development, analysis, computation, and visualization of data and algorithms) to go beyond the surface to essentially measure a person's bone structure, explains Ramalingam. A stereo camera that can process data on the fly at 24fps records the images. In addition, the system can photograph just pieces of a person's face, such as an unusual chin, nose, ears, or mouth, and those segments can easily be compared to a full photo.

Ramalingam says that their system is ready for use as a research product, with no anticipated to-market time as of yet.

Step Aside, Silicon: Neuronal Computing Is On The Way



"The whole is greater than the sum of its parts." It's certainly true of our brains, and the redundancy within groups of neurons. With individual neurons only capable of a 40% success rate of exciting a response after sending a signal to another neuron, our brains function only because many grouped neurons firing together raises the reliability ante considerably.

The necessity of redundancy paired with the unreliable nature of neurons have been a bugaboo for researchers trying to create computational devices that could bridge the gap from man to machine. However, Professor Elisha Moses of the Weizmann Institute of Science and his students, Ofer Feinerman and Assaf Rotem, have taken on the challenge by using cultured hippocampus neurons from rats to create a reliable and simple logic gate circuit. The researchers scratched a square circuit shape into a base of a cell-repellant glass plate and then coated the scratch with adhesive that encouraged cell growth along the paths.

Rotem says, "The geometric constraints simplify the firing patterns observed in the neurons and enable the design of neuronal assemblies that can transport information, create directional channels of transmission, and even create devices that perform simple logic gates computation." The neurons are trained to grow along three sides of the circuit, while the fourth side holds a cluster of neurons, only in the middle, with the axons of that cluster reaching out as thinner "bridges" to the other sides. An ion blocker on the opposite side of the cluster keeps electrical impulses separated. When stimulated with a small amount of glutamate or potassium chloride, the neurons fire along the entire circuit.

There have been many challenges—both conceptual and technological. Rotem specifies that "relying on massive parallelism and on cooperativity between neurons whose response reliability is variable" is one such obstacle, as is harnessing all of it into a functional logic gate. Yet again, the whole was greater than the sum of its parts, and the fine-tuning the researchers did with the number of neurons in the circuit delivered the reliability they sought.

Rotem explains that their research will not be ready for market soon. "Our work provides a first insight into how many neurons can be put together into a functional, reliable computation unit. We do not anticipate a drop in Intel or IBM stock as of yet," he says. "These are not going to compete as computational devices right now."

However, Moses, Feinerman, and Rotem hope that their research may pave the way to the construction of reliable neuronal implants. The team has already been working on revealing how machine logic can interface with brain logic, which is key in designing chips that can "restore the vision to blind people or help paraplegic people guide robotic arms."

Researchers at Israel's Weizmann Institute of Science have created a neuronal diode, where brain cells are geometrically constrained to signal up a daisy chain.

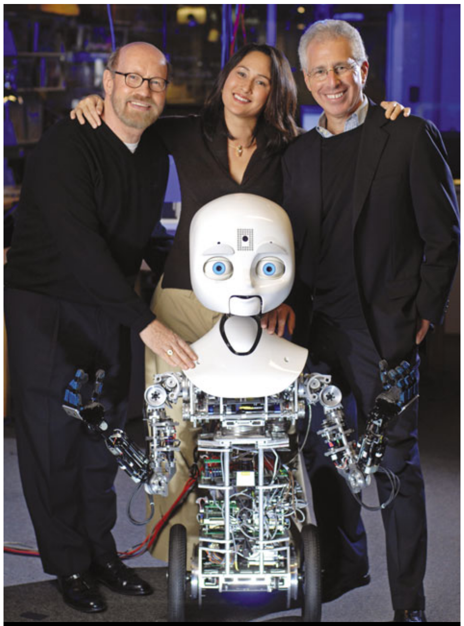
Storytelling Takes A Leap Into The Future

The art of storytelling is nearly as old as humanity itself. From ancient stories of the "big hunt," passed down around a fire, to modern books, films, magazines, plays, blogs, and online MUDs (multiuser dungeons), we are creatures of imagination and sharing. So, to usher our narrative into a bright new future, MIT's Media Laboratory and Plymouth Rock Studios have recently launched the Center for Future Storytelling, a seven-year research program.

"At the heart of this program is the observation that storytelling and technology are both fundamental parts of human culture," says Michael Bove Jr., one of the center's three co-directors. "At the intersection of the two, we see not only an evolution in entertainment, but applications to learning, creativity, healthcare, and quality of life—particularly for the young, disadvantaged, disabled, and elderly."

Although the program is still in its honeymoon period (the center opened at the end of 2008), the projects are in full force, focused on three areas: Object-based Media, Personal Robots, and Camera Culture.

The Object-based Media group is working on creating technology that infuses everyday objects with an artificial intelligence that can assist in a user's storytelling. Think of your shoes, your backpack, your car, your favorite mug—all collecting information that you can use later to tell your own stories. Also consider the group's Viper 2.0: professional-grade video-editing tools for amateur use. Viper 2.0 lets lay folk create videos that can react and self-edit to sensor feedback during user viewing, providing a very personalized experience.



Nexi is just one of several mobile, dexterous, and social robots built by co-director Cynthia Breazeal's (center) Personal Robots group at the MIT Media Lab's Center for Future Storytelling.

Also pictured: David Kirkpatrick (left; head of the center's collaborator, Plymouth Rock Studios) and Frank Moss (right; director of the MIT Media Lab).

The Personal Robots group is working on several autonomous characters that are intended for use in movies, on stage, and gaming, as well as in classrooms and long-distance communications. Whether striving to make robots more realistic through human-like mobility, gestures, expressions, and reactions, or more approachable with Muppet-like coverings and child-friendly interaction, the group's work centers around making robot technology engaging, reliable, and empowering.

Finally, the researchers from the Camera Culture group are heads down creating tools that will change how visual media is recorded, shared, and displayed. Projects include creating 4D and 6D displays; wearable fabric that tracks, computes, and predicts 3D human movement; and utilizing projectors to "morph" objects visually on a set from one thing to another.

According to Bove, some of the center's technologies are ready to market now, while others may not be ready for another five to 10 years. ▲

Real Or Robot: Let The Double-Take Begin

We've all seen them—whether on TV or at entertainment venues such as Disneyland—animatronic robots that have human likenesses, yet give rise to an unidentifiable ick factor from being somewhat "off." Neill Campbell, lead researcher of a team of robotics engineers at the University of Bristol, says that our sensitivity to accurate facial movements is why so many of us feel uncomfortable around animatrons.

The discomfort even has its own term coined by Japanese roboticist Masahiro Mori, "an uncanny valley," which sums up nicely the concept that the more lifelike a robot is, the more repulsed we humans become. But once we perceive a robot as nearly human, we gain empathy for it again. Campbell's team has come together with U.S. roboticist David Hanson to curtail the repulsion by creating "Jules," a realistically human animatronic head.

With the hope of someday crafting entire robots that could heavily interface with people in instructive, classroom, or healthcare situations, the Bristol researchers began their creation with the most important and basic aspect of communication: facial expressions. Jules is programmed to copy the expressions and lip movements of a person in front of a video camera; movements, once processed, are fed to 34 tiny servomotors in Jules' malleable rubber skin.

An animator was also brought in to fine-tune Jules' expressions manually (as the servomotors can't perfectly mimic emotions), and the settings were input to Jules' software. Jules can now copycat at 25fps, making him the first human-looking copycat robot around. ▲

CPU

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www.awollan.com

SCALE 7x - Los Angeles, CA
www.socallinuxexpo.org

02.21.09
Lanopolis 5.0 - Ottawa, Ontario, Canada
lanopolis.ca
NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

TeaBager's Anonymous - Yukon, OK
www.okteabag.org

UWL LAN Computer Science Club -
La Crosse, WI
www.uwlax.edu/csclub

02.27.09
Fragapalooza - Alberta, Canada
www.fragapalooza.com

Overkill LAN Party - Tampa, FL
www.overkill-lan.com

02.28.09
Intel LAN Fest Portland - Portland, OR
lanfest.intel.com

NCGC LAN Party - Groveton, NH
www.electronicesthetics.com/LANParties.htm

NWALAN - Fayetteville, AR
www.nwalan.com

03.01.09
ICT Gaming - Wichita, KS
www.ictgaming.com

LANmaniac BYOC LAN Party - Brea, CA
www.lanmaniac.com

03.06.09
Digital Overload - Providence, RI
www.digital-overload.com

Jacksonville Gamers / March Lan Madness -
Jacksonville, FL
www.jaxgamers.com

03.07.09
LANManiac - Brea, CA
www.lanmaniac.com

TBAG LAN - Thunder Bay, Ontario, Canada
www.tbaglan.org

UWL LAN Computer Science Club - La Crosse, WI
www.uwlax.edu/csclub

03.13.09
Madicon LAN Party - Harrisonburg, VA
www.madicon.org

03.14.09
CapLAN - North Vancouver, BC Canada
caplan-bc.com

E-Town LAN - Emporia, KS
www.etownlan.com

LAN Lordz - Wichita, KS
www.lanlordz.net

Toronto FragFest - Toronto, ON Canada
www.torontofragfest.com

03.21.09
Iron Storm 10 - Castle Shannon, PA
www.pittco.org

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Outback Gaming Party - Van Wert, OH
cloud.prohosting.com/vwturks/html/ogp.html

03.27.09
Intel LAN Fest Infernal LAN - DuPont, WA
lanfest.intel.com

03.28.09
Exile Computer Gaming - Albany, NY
www.exilecomputergaming.com

Peace, Love, and Rockets - Keller, TX
www.peaceloveandrockets.org

04.01.09
Arkansas LAN - AR
www.arkansaslan.com/index.php

ICT Gaming - Wichita, KS
www.ictgaming.com

04.04.09
LANManiac - Brea, CA
www.lanmaniac.com

04.11.09
LAN Lordz - Wichita, KS
www.lanlordz.net

04.18.09
NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

04.24.09
Netwar 17.0 - Omaha, NE
www.netwar.org

R-Dot LAN - Regina, Saskatchewan, Canada
www.r-dot.org

04.25.09
CVTC LAN Party - Yukon, OK
www.nolifegamer.com

Delaware LANatics - Dover, DE
www.delanatics.com

E-Town LAN - Emporia, KS
www.etownlan.com

NCGC LAN Party - Groveton, NH
www.electronicesthetics.com/LANParties.htm

05.01.09
ICT Gaming - Wichita, KS
www.ictgaming.com

05.02.09
LANManiac - Brea, CA
www.lanmaniac.com

05.08.09
LANapalooza - Aurora, ON Canada
www.zeropingevents.com

05.16.09
NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

05.23.09
Lower MainLAN - North Vancouver, BC Canada
caplan-bc.com

05.30.09
NCGC LAN Party - Groveton, NH
www.electronicesthetics.com/LANParties.htm

OnTargetLan - Hot Springs, AR
www.ontargetlan.com/news.php

Peace, Love, and Rockets - Keller, TX
www.peaceloveandrockets.org

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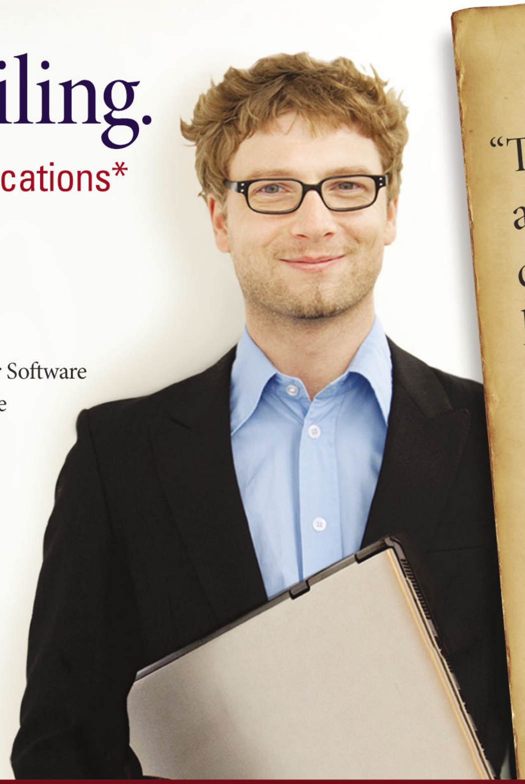

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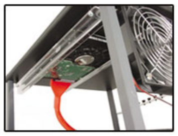

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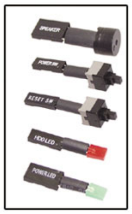

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Q&A With Craig Barratt

Craig Barratt is chief executive officer of Atheros Communications, one of the biggest makers of Wi-Fi chips. Barratt is the John the Baptist of wireless networking as it spreads beyond applications connecting PCs to the Internet. Wi-Fi is now making its way into consumer electronics gadgets such as Eye-Fi memory cards that can automatically upload pictures or video to the Internet straight from a digital camera. Atheros has shipped more than 200 million Wi-Fi chips and has become the No. 1 vendor.

Q **The challengers to Wi-Fi have had a hard time establishing themselves, particularly in home networking. Why?**

CB It's been interesting to watch for several years how some technologies have developed, like ultra wideband. It was shown off in demos. But it has disappeared completely. The standard never got finalized. The speeds of 802.11n closed the gap so there was no performance benefit to Wireless USB and ultra wideband. The applications just didn't resonate.

Q **You dodged that market. Meanwhile, Wi-Fi is expanding in new directions and taking over from the other players.**

CB We deliberately chose not to invest in ultra wideband. That said, the applications that ultra wideband tried to do are still going to happen, and a lot of them are becoming Wi-Fi based. In fact, Bluetooth was going to use ultra wideband as the next-generation physical layer and allow MP3 players to sync more quickly. The Bluetooth special interest group decided to abandon ultra wideband in favor of Wi-Fi.

Q **Intel has pushed the MyFi personal area network. What do you think of it?**

CB Intel says Wi-Fi is so flexible you can use it for a personal network, too. We believe in that future, too. But we are a bit more realistic. We believe that you need full backward compatibility with Bluetooth. Bluetooth is so prevalent for voice and headsets. Saying we will do everything with Wi-Fi, that doesn't make sense. You need both Bluetooth and Wi-Fi.

Q **When will these 60GHz wireless technologies be ready for prime-time?**

CB At 60GHz, in three to four years, we will be here at the Consumer Electronics Show, and there will be meaningful and widespread applications. There will be laptops and TVs and media devices. Here are a couple of the attributes. The higher the frequency, the less it bends around objects and goes through objects. In extreme cases, it's like visible light. 60GHz is almost like that. It wouldn't go through a typical construction wall. That's bad. So 60GHz won't provide whole-house coverage. And that's why that technology won't replace what we are doing at 2.4GHz and 5GHz. Those technologies will be for wider area coverage, meaning house scale or enterprise scale. The big benefit of 60GHz not going through walls is that each area in a room or office will have its own multi-gigahertz network, and there will be no interference.

Q **How much of the Wi-Fi market is in consumer electronics?**

CB If you count game consoles and game handhelds, it's significant. If you carve those out, then it's modest but growing. It's growing at the high end with things like networked TVs and connected Blu-ray players.

Q **What changed to get Wi-Fi established inside consumer devices?**

CB It's growing. In the cell phone area, we now have over 40 design wins for dual-mode Wi-Fi handsets using our chips. The iPhone, which is not Atheros-based, has Wi-Fi. That has made it critical for almost all smartphones going forward. Products that really change the mindset can create a lot of followers. Digital cameras with Wi-Fi are going up. The Sony PlayStation Portable and the Nintendo DS use Wi-Fi. The handheld gaming area for us is very important. The new Nintendo DSi has an Atheros chip in it. Other handheld devices with Wi-Fi are growing, too.

Q **What are the next steps up in speed for Wi-Fi?**

CB On the standard side, we have 802.11g shifting to 802.11n. The n version has several flavors. It doesn't have to use multiple antennae.

Q **Can it get up to gigabit per second speeds?**

CB The 802.11n can scale up to 600Mbps. I think 60GHz will be the path to higher rates over the next several years. ▲

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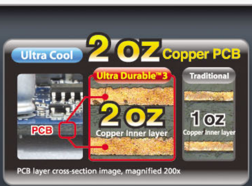

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